...AMERICAN AVIATION

REFERENCE COPY

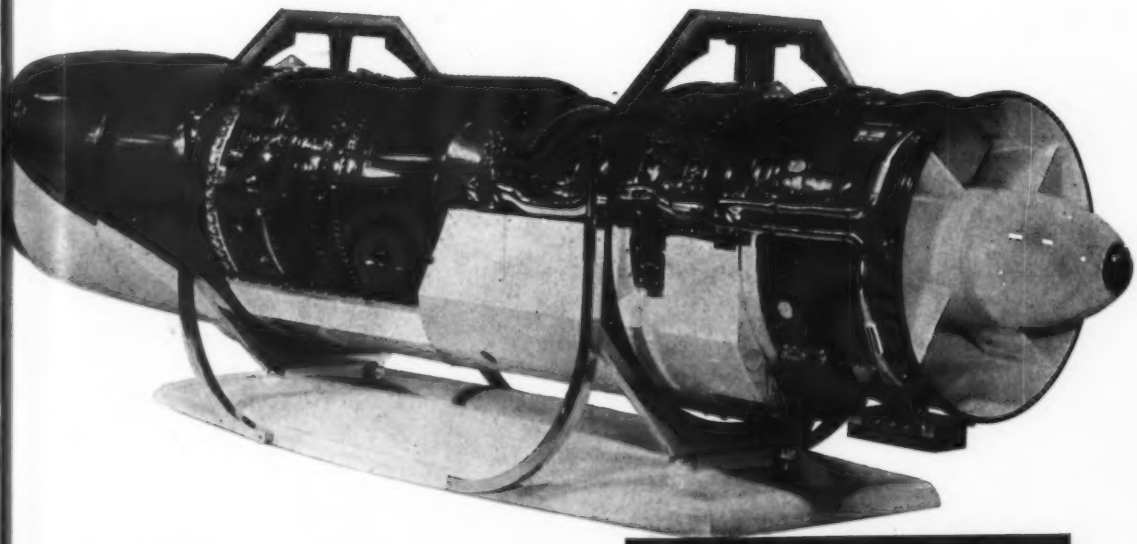
RECEIVED
13 DEC 1957
ARMY LIBRARY
SERIAL RECORD

The world's newest supersonic jet engine...

the

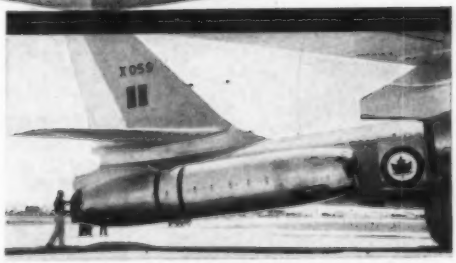
IROQUOIS

The Iroquois designed, developed and produced by Canadians is the supersonic successor to the Orenda jet engine, 4,000 of which are in service on four continents.

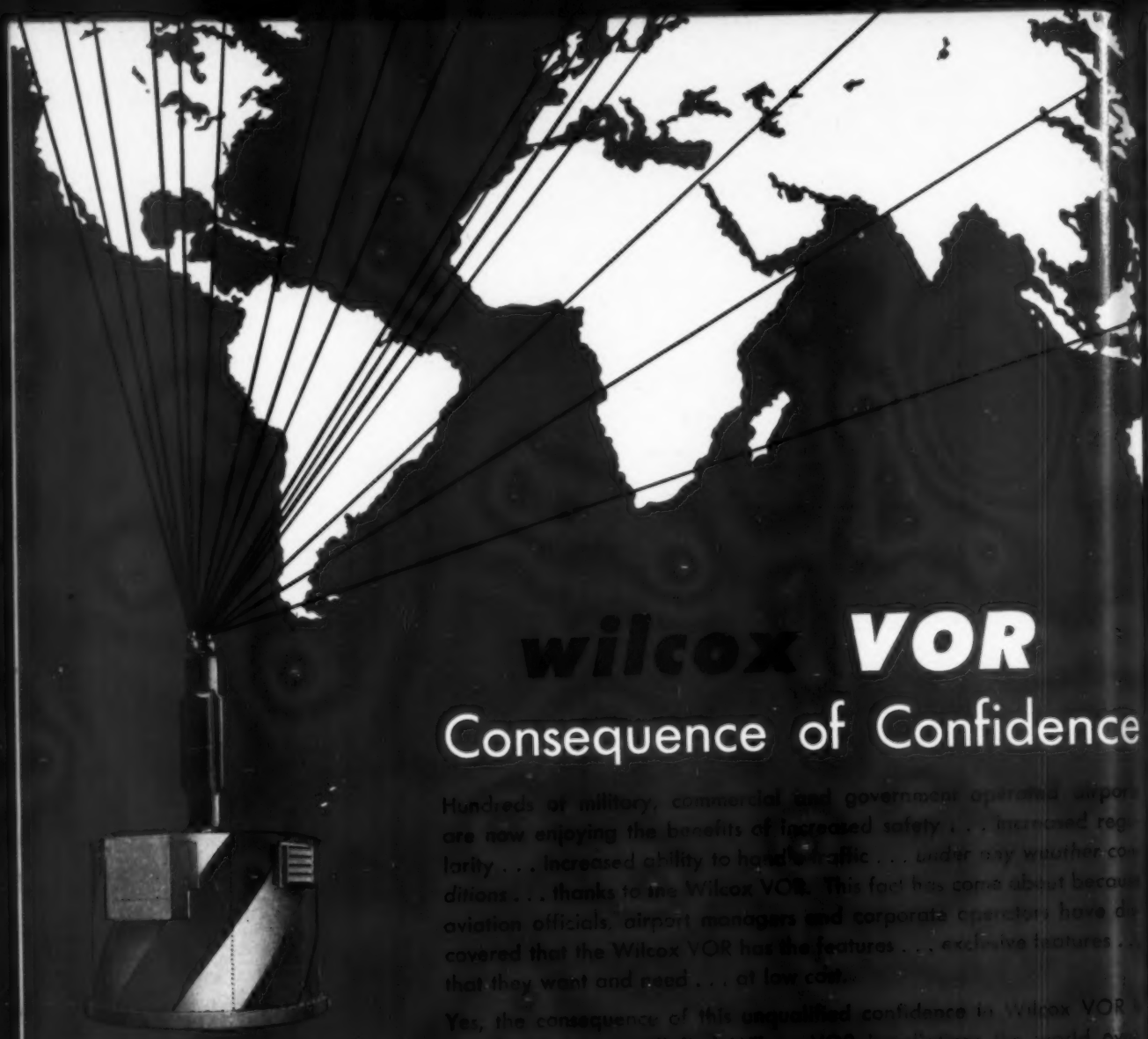


ORENDA
ENGINES LIMITED
MALTON, CANADA

...ER: A. V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP



FLIGHT TESTING THE NEW IROQUOIS AT MALTON
The supersonic Iroquois is carried in this specially designed pod at the rear of a B-47.



wilcox VOR

Consequence of Confidence

Hundreds of military, commercial and government operated airports are now enjoying the benefits of increased safety . . . increased regularity . . . increased ability to handle traffic . . . under any weather conditions . . . thanks to the Wilcox VOR. This fact has come about because aviation officials, airport managers and corporate operators have discovered that the Wilcox VOR has the features . . . exclusive features . . . that they want and need . . . at low cost.

Yes, the consequence of this unqualified confidence in Wilcox VOR is the fact that you will find Wilcox VOR installations the world over. More than 300 to be precise.

wilcox VOR Gives You . . .

. . . the most advanced type of modulation eliminator which does not waste RF power. No problems of maintaining bridge circuit balance and no need to employ special vacuum tubes.

. . . complete remote control over one pair of wires as compared to the usual three.

. . . an electronic sub-carrier generator that eliminates the difficult and precise maintenance procedures required on earlier type VOR wheel mechanisms.

. . . unmatched performance at low cost.

Circle No. 109 on Reader Service Card.

May We . . .

send you full information and technical data on the Type 423 and 433 VOR? This data describes, illustrates and provides complete specifications for both the 50 and 200 watt Wilcox VOR stations.

wilcox

ELECTRIC COMPANY, INC.

Fourteenth and Chestnut

Kansas City 27, Missouri, U.S.A.

Advanced Systems Of Ice Protection Pioneered By Goodyear—already proved in actual Arctic Circle operation on military jet aircraft – Pave Way For New Commercial Jet Airliner.

The Boeing 707, commercial jet transport, will fly with the most advanced type of ice protection on all three leading edge surfaces of its huge empennage:

Iceguard by Goodyear!

Embodying revolutionary electrothermal systems of ice protection – developed through the teamwork of the National Research Council of Canada and Goodyear—one system of the Iceguard has already been in lengthy service above the Arctic Circle on the Canadian Avro CF-100 all-weather fighters.

Now the other has been selected by Boeing for jet transport service.

For information on the erosion-resistant Iceguard—how these two systems of foolproof ice protection can be applied to air scoops, wings, propellers, antennas, pipe, conduit—anywhere ice presents a problem—write: Goodyear, Aviation Products Division, Akron 16, Ohio, or Los Angeles 54, California.

ICE PROTECTION BY

GOODYEAR AVIATION PRODUCTS

Where Research and Development work to Advance America's Global Position In The Race For Air Power

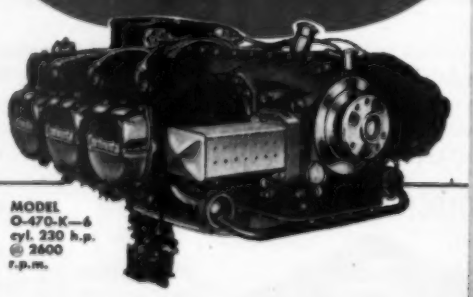
Iceguard – T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

TODAY'S FINEST EXECUTIVE AIRCRAFT FLY WITH

DEPENDABLE CONTINENTAL POWER

● Behind the growing dependence on airplanes as adjuncts to business is the fact that for company after company they are more than paying their way. As pioneer and leader in utility aircraft power, Continental Motors finds solid satisfaction in its role as engine source for the outstanding planes of this type. It has every reason to believe that the performance of these engines—their power, economy and dependability as proven in thousands of hours of flying—has been not only a major factor in the leadership of those aircraft, but one destined to assure their ever-wider use.

FOURTEEN ENGINE MODELS
65 TO 320 HORSEPOWER
In the line are two 4-cylinder and twelve 6-cylinder models, including four engines for military, and one for helicopter use.



MODEL O-470-K—6 cyl. 230 h.p. @ 2600 r.p.m.

CONTINENTAL'S FACTORY RE-MANUFACTURE PLAN

. . . successor to the periodic overhaul, backs you with the specialized skills of the men who know your engine best. With your factory re-manufactured Continental, you get new engine warranty—new log book with zero hours—at a modest, pre-determined price. Most important of all, you're back in the air with an absolute minimum of down time.

●

THE NEW AGE OF SPACE IS HERE

- In today's Air Force, men with technical training are finding Opportunity with a capital "O". Security, advancement, regular pay increases, and retirement offer strong inducements to the qualified enlistee. For the facts, address: Airman Information, U. S. Air Force, P.O. Box 7608, Washington 4, D. C.

Continental Motors Corporation
AIRCRAFT ENGINE DIVISION
MUSKEGON • MICHIGAN

Circle No. 102 on Reader Service Card.

WAYNE W. PARRISH, Editor and Publisher
ROBERT H. WOOD, Editorial Director
JOSEPH S. MURPHY, Executive Editor
ALBERT W. BENTZ, Managing Editor
ERIC BRAMLEY, Chief News Editor

WILLIAM V. HENZEY Transport	WALLACE I. LONGSTRETH Cargo
ELIZABETH OSWALD Military	GEORGE R. SHAW, JR. Airports, Business Aircraft
LOIS C. PHILMUS Military	MARY L. MILLER Rates & Tariffs
WILLIAM O'DONNELL Manufacturing	DeWITT BALLEW Business News
ANTHONY VANDYK International	BERNARD BROWN Copy Desk
HENRY P. STEIER Electronics Engineering	CLIFFORD ALLUM Editorial Assistant
WILLIAM BELLER Aero Engineering	JEAN-MARIE RICHE Paris
CHARLES SCHAEFFER Congress	JAMES H. STEVENS London
DONALD FREDERICK Civil Aeronautics Board	SELIG ALTSCHUL Contributing Financial
GERALD A. FITZGERALD Airline Economics	S. P. SAINT Contributing Operations
FRED S. HUNTER West Coast	WILLIAM H. MARTIN Art
RICHARD van OSTEN West Coast	JOHN WALEN Production
KEITH SAUNDERS News Analysis	ARTHUR J. NEWFIELD Director of Marketing

ARAX ODABASHIAN Librarian

LEONARD A. EISERER, General Manager

M. MICHAEL CERICK, Advertising Sales Manager

EDITORIAL OFFICES: 1001 Vermont Ave., N. W. Washington 5, D. C. U.S.A. Phone: Sterling 3-5400. Cable AMERAV. Advertising Offices: 1 East 48th Street, New York 17, N. Y., U.S.A. Phone: Plaza 3-1100.

BUSINESS OFFICE . . . Lawrence L. Brettner, Circulation Director; Geneva C. Kinnaird, Circulation Fulfillment Manager; Ellen P. Coakley, Advertising Service Manager.

REGIONAL OFFICE . . . New York City: 17 East 48th St., New York 17, N. Y. M. Michael Cerick advertising sales manager; Robert Weston and Frederick W. Pratt, regional advertising managers. Phone Plaza 3-1100. **West Coast:** 8943 Wilshire Boulevard, Beverly Hills, Calif., Fred S. Hunter, manager; John Ball, Jr., regional advertising manager. Phone: Bradshaw 2-6561, and Crestview 6-6605. **Canada:** Allin Associates, 12 Richmond Street East, Toronto 1, Ontario. Phone: Empire 4-2001, Allin Associates, 1487 Mountain Street, Suite 4, Montreal, Quebec. **Chicago:** 139 N. Clark St. Chicago 2, Ill. Laurie S. Seward, regional advertising manager. Phone Central 6-5804. **Miami:** International City, 4471 N. W. 36th Street, Miami, Florida. Richard A. Worthington, regional advertising manager. **Detroit:** 201 Stephenson Bldg., Detroit 2, Mich. Phone Trinity 5-2555. Kenneth J. Wells, regional advertising manager. **Cleveland:** Hanna Bldg., Room 1046, 1422 Euclid Avenue, Cleveland, Ohio. Phone Prospect 1-2420. Douglas H. Boynton, regional advertising manager. **London:** The AAP Company, 17 Drayton Road, Boreham Wood, Hertfordshire, England. Phone ELStree 2688. Cable Address: STEVAIR, London. **Paris:** Jean-Marie Riche, 11 Rue Condorcet, Paris (9e). Phone TRU 15-39. Cable Address: NEWSAIR PARIS.

PUBLISHING INFORMATION . . . Published: Every other Monday by American Aviation Publications, Inc., Washington, D. C. Printed at The Telegraph Press, Harrisburg, Pa. Entered as Second Class Matter in Washington and Harrisburg. **Subscription Rates:** For U. S. and Canada—$5.00 for 1 year; $8.00 for 2 years. Other countries—$7.00 for 1 year; $12.00 for 2 years. Subscription limited to aviation industry personnel. **Incorporates:** Airports and Air Carriers; Aviation Equipment; The American Pilot; Aviation Sales & Service; U. S. Aviation, and American Airports. All rights to these names are reserved. **Change of Address:** Send old address (exactly as it appears on mailing label on your copy of magazine) and new address, including zone number if any to American Aviation, 1001 Vermont Avenue, N.W., Washington 5, D. C. Allow two weeks for changeover.

BPA NBP

DECEMBER 16, 1957—VOL. 21, NO. 15

AMERICAN AVIATION

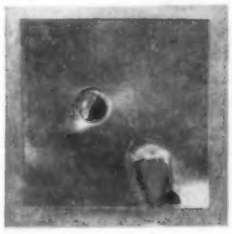
WORLD'S LARGEST AVIATION PUBLISHERS

Army tests Vertol's twin-turbine H-21

Army aviation men got a good look at two versions of Vertol Aircraft Corp.'s twin-turbine H-21 helicopter at the Pentagon heliport. Vertol says payload has been boosted 40%, speed 50 mph. Page 31.

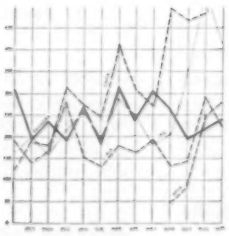
CAA steps up flight-inspection program

Aided by the delivery of first of five Convair 440S, CAA is stepping up its inspection of the U.S.'s complex network of Navaids and traffic control facilities. Page 37.



Ceramic coatings help metals beat heat

Were it not for newly developed ceramic coatings, most metals wouldn't be able to withstand high supersonic temperatures. For analysis of problems solved see page 43.



South American 'cut-raters' hurt U.S. airlines

Cut-rate practices of some South American airlines have taken business away from Panagra and Braniff, international editor Anthony Vandyk discloses in first-hand report. Page 52.

Contents

TRENDS, DIGEST, BUSINESS

Airtrends 21
Digest 22
Transport Trends 57
Industry 58

INDUSTRY

AF takes over new role in production 27
Space suit for X-15 flight 28
First photo of Ryan Vertiplane 28
Manned bomber still No. 1 striking weapon 29
'Modern' exams proposed for pilots 30
Vision is problem in high-speed flight 30

HELICOPTERS

Vertol tests turboshafts with H-21 31
Fiat proposes six-place copter 32

PRODUCTION

New process for 'hot-spinning' titanium alloy 35
Riveting machine that moves to its job ... 35
C-W operates giant extrusion press 35

GENERAL AVIATION

Pilot's view of the Piper Comanche 36
Convairs speed CAA flight inspections 37

ENGINEERING

How ceramics help metals beat heat barrier 43

ELECTRONICS

VOCAB: Voice communications system .. 45

AIRPORTS

Los Angeles starts $46-million project 46

TRANSPORT

CAB chairman: Old job gets new power .. 49
Committee to clear Sawyer in 'leak' case .. 50
Why airline earnings are low, unpredictable 51
Cut rates hurt U.S. carriers in South America 52
Finnish airlines are efficient, profitable 54

DEPARTMENTS & FEATURES

Personal View 7
Letters 9
Spotlight 12
When & Where 18
International 63
Honors 64
West Coast Talk 68
Sidelights 73
People 75
Books 76
En Route 78

PHOTO CREDITS

USAF, p 28; Ryan, p. 28; Vertol, p. 31; Fiat, p. 32; Piper, p. 36; AiResearch, p. 31; Ostergaard, p. 43; Barnesdril, p. 45; Fabrica Militar, p. 63.

64,200 Copies of This Issue Printed.

Copyright 1957 by American Aviation Publications, Incorporated

Coming January 13 . . . First of an exclusive series on business and executive aircraft co-authored by aviation consultants R. Dixon Speas and John J. Casey, Jr. How should one go about deciding which of many aircraft on the market best suits a company's transport needs? What important factors must be considered . . . size, speed, range, etc.? Look for answers to these questions and many others in the January 13 issue of AMERICAN AVIATION.

PERSONAL VIEW

Another ARC Flight Proved Product

The Type 210 360 Channel VHF Transceiver. Now available—a high powered VHF Transceiver that permits two-way communication on ALL frequencies likely to be used for many years . . . choice of *any* required frequency for any part of the country, whether you fly under VFR or IFR conditions. Here is extra safety insurance for you and others on today's more crowded airways.

THE SYSTEM:

- **Frequency range: 118.00 to 135.95 mc**
- **360 channels, spaced 50 kc**
- **Weight of entire system: 22 pounds, compact size**
- **Operation: single channel simplex or double channel simplex by pilot selection**

TRANSMITTER:

- **Power output: 15 watts, high level amplitude modulation**
- **SCS/DCS: Transmitter can operate 6 mc higher than receiver in DCS position and on same frequency in SCS control position**

RECEIVER:

- **Sensitivity 2 microvolts at 10 db $\frac{S+N}{N}$**
- **AVC: 3 db, 10 to 10,000 microvolts**
- **Image rejection: over 70 db; all other spurious rejections over 80 db**
- **Automatic noise limiter**

Backed by 29 years of leadership in airborne electronic equipment exclusively, and over 18 months of laboratory and flight testing, the Type 210 assures you of ARC's well known exacting standards of engineering and quality manufacture.

Ask your dealer or write us for descriptive brochure.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation **BOONTON, NEW JERSEY**

Omni/Loc Receivers • Course Directors
Miniaturized Automatic Direction Finders • LF Receivers and Loop Direction Finders • UHF and VHF Receivers and Transmitters • 10-Channel Isolation Amplifiers • High Powered Cabin Audio Amplifiers • Interphone Amplifiers
Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators

ARC

Circle No. 128 on Reader Service Card.

Why the U.S. is behind

WHY IS the United States lagging behind the Soviet Union in the weapons race? We submit that the following is the root of the trouble.

1. The military is responsible for the development of radically new weapons concepts. It should not be. In the entire history of the U.S., this country has held undisputed weapons superiority *only* at the end of World War II and the decade that followed and *only* because new weapons responsibility had been handed over to an independent civilian agency (the wartime Office of Scientific Research and Development). The military is preoccupied with short-time readiness; it is concerned only with weapons now available. It is trained to think only in short-range terms. Thus the military stalls development of radical new weapons concepts.

2. The private enterprise system of the U.S. is superior to Soviet socialism and has demonstrated this superiority in every field except one. That exception is weapons procurement, for the simple reason that private enterprise in this field is stripped of all the incentives and freedom which have made it superior in all other fields. The incentives are all in reverse, such as adding to costs and rejection of labor-saving equipment because of Pentagon fiscal policies which place a penalty on efficiency.

In the above two paragraphs are the essential points of perhaps the most devastatingly effective and convincing critique ever made of the weapons development system of the United States.

The author is Dr. J. Sterling Livingston, professor of business administration at the Harvard Business School. The subject is "Decision Making in Weapons Development," appearing in the *Harvard Business Review* for January-February, 1958. (Preprints are available at $1.00 a single copy from the magazine at Soldiers Field, Boston 63, Mass.) We recommend that you obtain and read the entire article several times. Dr. Livingston has worked with aircraft companies and the government. He writes from intimate knowledge. His thesis is irrefutable, in our opinion.

The writer of this page had the pleasure of hearing Dr. Livingston present his case to a group of important businessmen some weeks before the article appeared in print. The thought has occurred time and time again: Why is it that in this great country of ours the basic weaknesses of our weapons development haven't been tackled during the past ten years? Why is there such an absence of understanding in the White House and the civilian command at the Pentagon? Why is it that the military, who have a readiness job to maintain, have been allowed to take over and defeat the very advantages and benefits which private enterprise have over state socialism?

The Soviet Academy of Sciences, which is responsible for both the earth satellite and the intercontinental ballistic missile programs, *is an independent agency outside the control of the Soviet Ministry of Defense.*

Unless this country revises its weapons development, there is no hope whatever of "catching up" with the Soviet Union.

There is a fallacious idea around that this country has always been ahead until recently. The fact is that we have *never* been ahead of anybody except during the period near the end of World War II and for the following decade.

The reason is very simple when it's spelled out and that reason is the very role and function of the military. Its job is readiness, and this means today's weapons and today's weapons only. Development of new engines, for example, is often stalled by the military because the military has nothing *at the moment* calling for such new engines. And in the military's urgency to attain peak readiness at all times, it utilizes the vast percentage of its funds for readiness purposes.

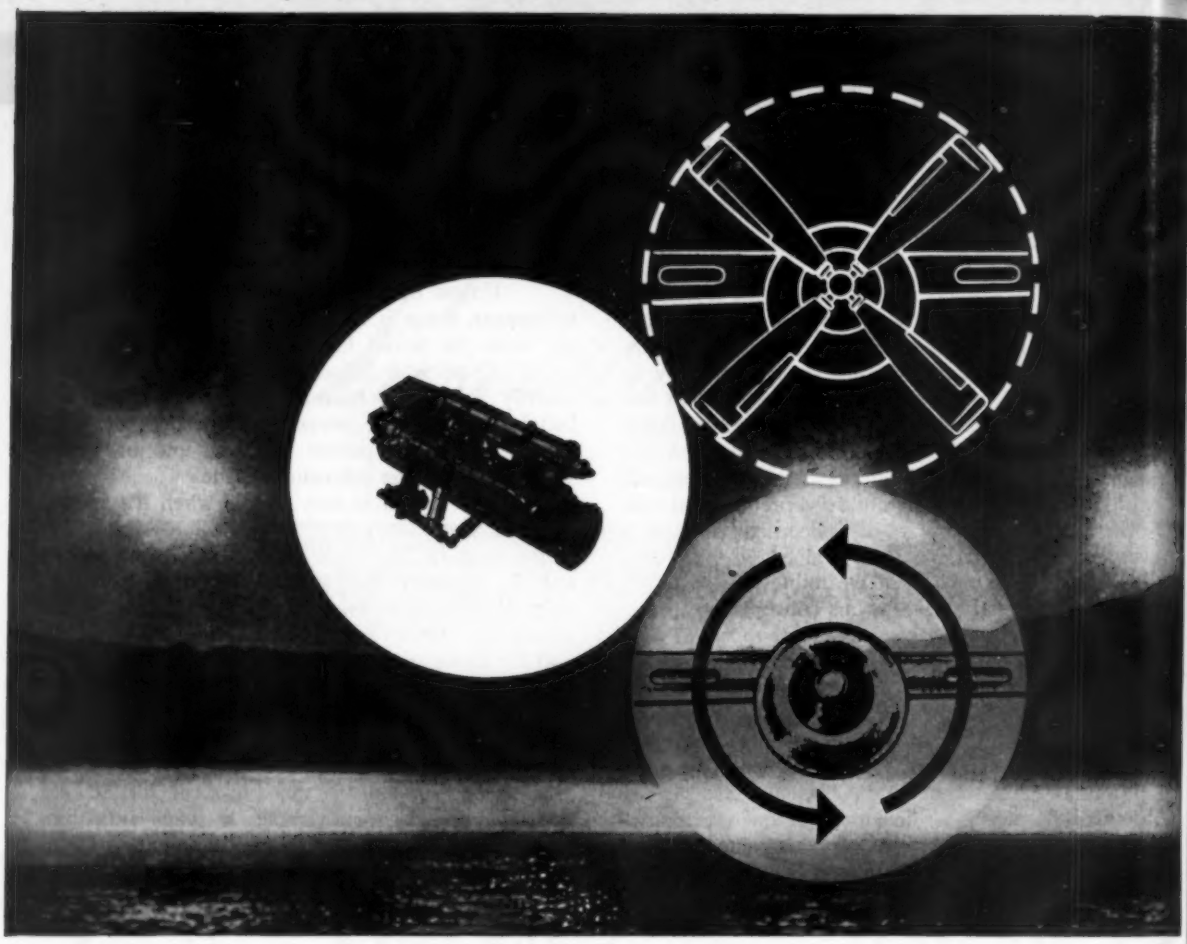
The position of Dr. James R. Killian, Jr., as Special Assistant to the President for Science and Technology, for example, is made ridiculous in the light of facts. He is quite impotent as far as the basic problem is concerned, for he has no authority and no budget. The sole solution is a civilian agency (like OSRD) which is given *full and exclusive* authority for long-run weapons research along with the budget to carry weapons development through prototype testing and demonstration.

But weapons design and development is only one part of the problem. In retrospect the Pentagon's handling of contractors has been a farce and shambles. It has been more harmful in the long run than any conceivable action by the Soviet Union, save war, yet *we* are supposed to have the brains and the knowhow. We have talked private enterprise and acted in a bureaucratic manner far worse than the Russians—because even the Russians were smart enough to separate development from the military.

Dr. Livingston's article should get thorough reading in high places. The government can wipe out all manner of advisers and councils and whatnot, and get down to a basic approach—and save money in the long run. The Pentagon has been the costliest jungle of research and development in all recorded history.

For, did you know, even with the reduced purchasing power of the dollar, *that the effort devoted to research and development for national security constitutes approximately the same percentage of our gross national product as was expended at the peak of World War II?* And what have we got for it? About twenty cents on the dollar. Read it and weep.

Wayne W. Parrish



new light on a cold problem by

Janitrol

In the land of the midnight sun—or anywhere the temperatures drop down to −65°F and stay there—Janitrol hot fuel prime systems provide positive engine starting in a matter of minutes.

In a series of tests for example, a Curtiss-Wright turbo-compound engine which had been cold soaked for three solid days at −65°F was started in 60 seconds and running clear in 3 minutes. This was not an isolated example. The Janitrol unit does it repeatedly.

The unit is less than 18 inches long, weighs under 16 pounds, heats fuel from −65°F to 200°F and supplies hot fuel at the rate required as long as necessary to insure smooth starts.

Janitrol's broad experience in solving such problems has led to other important developments: such as Janitrol high-temperature high-pressure couplings; pneumatic controls, heat exchangers, and purge gas systems. Call your nearby Janitrol representative. Janitrol Aircraft-Automotive Division, Surface Combustion Corporation, Columbus 16, Ohio.

Circle No. 124 on Reader Service Card.

LETTERS

Deny Corporal is outdated

To the Editor:

I note in the Nov. 18 issue of AMERICAN AVIATION, under the heading "Personal View," some erroneous information about the Corporal Missile System.

The Corporal is not an outdated missile. I am sure you must have been confusing it with early versions that heretofore have borne such designations as "Wac Corporal" and "Corporal E." The Corporal is in current volume production. According to present plans and future planning of Army Ordnance, it appears that it will be very much alive for years to come.

Accordingly, I am sure that the comment which you made is a matter of concern to the thousands of troops trained in and using the Corporal System as well as to the contractors who produce it. It may also cause needless concern to our allies who may now be using the weapon, as well as to the foreign students at the Ordnance Guided Missile School in Huntsville (Ala.) who are studying the missile for possible use by their countries. *H. I. GIBSON, general manager, Guided Missile Division, The Firestone Tire & Rubber Co., Los Angeles, Calif.*

To the Editor:

As one of the two prime contractors to U.S. Army Ordnance on the Corporal Missile Weapons System, your editorial comment in AMERICAN AVIATION dated Nov. 18 that the Corporal missile is "an outdated object and has long since been out of production" came as a distinct surprise and shock. Corporal is the only surface-to-surface tactical ballistic missile currently in operational status in the United States and Europe. It is now and has been in quantity production and will continue in production.

Corporal is currently being produced and delivered to the British Army as well as the U.S. Army. As stated by President Eisenhower during his nationwide address, Corporal is a definite national asset. Corporal is not regarded as an outdated object by qualified military missile experts. Military weapons do not become outdated until newer weapons are developed, tested, produced and placed into operation.

To achieve victory, military commanders must rely on equipment that is at hand rather than on equipment in a future delivery status. In fairness to your readers, to U.S. Army Ordnance, to the Army troops using the Corporal equipment, to Firestone and to Gilfillan, it is requested that you correct the regrettable misinformation contained in your editorial in an early issue of your publication. *GILFILLAN BROS., INC., Los Angeles, Calif.*

EDITOR'S NOTE: All U.S. procurement of the Corporal has ceased, according to information from highest authority, but production continues for time being for NATO, with Great Britain as the only recipient (of limited quantities) at the moment. Thus the editorial reference to the Corporal being out of production was only partially inaccurate.

True, the Corporal has been the first fully operational missile in the U.S., and remains so for the moment, but it is also quite obsolete and will be replaced shortly by the Sergeant, as announced some time ago, and for which production orders have been issued. This is no discredit whatever to Gilfillan and Firestone, which are contract producers, but due only to evolutionary development of weapons.

Relax, please

To the Editor:

Please take S. Saint's bottle of tranquilizer pills away from him when he is writing. That Nov. 18th article was the relaxingest I've read in a long time, but:

Who, in their right mind, would attempt a take-off with fouled plugs? It doesn't take long to check mags again and use a burn-out procedure if necessary. To me, this certainly fails to spell progress.

Using a marvelous tool such as the ignition analyzer at the *right* time, not as an afterthought, *is* Progress.

Radar will not "relax" a cabin full of passengers when you are "swivel-hipping through a sky full of thunder storms." Radar will not "relax" me either when "broken field running" thru thunderbusters.

I could expostulate, but I've been looking ahead, and in doing so, have become too relaxed to write. *Relaxedly (?) Yours, WILLIAM Y. ANDERSON, Capt., UAL, Anaheim, Calif.*

BIG NEWS ABOUT A LITTLE PRODUCT

(ACTUAL SIZE)

Bendix "PYGMY" Electrical Connectors

- Gold Plated Contacts
- Closed Entry Sockets
- Resilient Scinflex Insert
- Alumilite or Cadmium Plate Finish
- Two Quick Disconnect Couplings—Double Stub Quick Action Thread or Three-Point Bayonet Lock
- Light Weight
- Small Envelope Size
- Maximum Serviceability
- Can be pressurized to current MIL-C-5015 specification
- High Strength Aluminum Shells
- Variety of Styles Available—General Duty, Environmental Resisting, Potting Types, Jam Nut Receptacles, Hermetically Sealed Receptacles
- Wide Choice of Insert Patterns (1 to 55 contacts)
- Designed especially for miniaturized Electronic Equipment

New "PYGMY" Connectors for Miniaturized Electronic Equipment Installations

Although the newly developed "Pygmy" line of miniature electrical connectors is approximately one third smaller in size and weight than the standard Bendix® AN connector, they provide the same outstanding qualities of serviceability, ruggedness, reliability and resistance to vibration, moisture and corrosion for which all Bendix connectors have become world famous.

If you have an application for miniaturized electronic equipment requiring lighter and smaller connectors than standard AN types, you'll find Bendix "Pygmy" connectors the best possible solution. Write for complete detailed information. SCINTILLA DIVISION OF BENDIX AVIATION CORP., SIDNEY, N. Y.

®REG. U.S. PAT. OFF.

Scintilla Division

SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

To protect jetliners from hydraulic fluid fires . . .

TWA SPECIFIES SKYDROL 500

For improved protection against hydraulic fluid fires, all 30 jetliners in Trans World Airlines' new Convair 880 fleet will come factory-equipped with Skydrol 500, fire-resistant hydraulic fluid.

Skydrol is the practical solution to concern about danger from hydraulic fluid leaks. It is a fire-resistant, lubricating chemical, not an oil. Today, more than 700 airplanes in 40 of the world's major airlines are protected by Skydrol. They have logged over 8,000,000 flying hours . . . overwhelming proof that Skydrol gives practical operation. Tomorrow, when a TWA Convair speeds from New York to Los Angeles just a step b the sun, it will enjoy proved service from Skydr

Jet- or propeller-powered, there's a Skydrol for aircraft. Conversion from your present fluid is and costs comparatively little at overhaul time. you're ordering new aircraft, simply specify a Sk firesafe hydraulic system as original equipment. tect your planes and passengers from threat of draulic fluid fire. Be safe . . . with Skydrol.

50R CONVAIR 880 JET FLEET

Major Airlines Now Specifying Or Using Skydrol...

Western	Canadian Pacific
Alitalia	Trans-Caribbean
Swissair	Riddle Airlines
United	Panair de Brazil
American	Alaska Airlines
Braniff	A.V.B. (Brazil)
Delta	Ethiopian Airlines
Northeast	T.C.A.
Northwest	S.A.S.
Cathay Pacific	Air India
Continental	Capital
Flying Tiger	Eastern Air Lines
Pan American	TWA

For more facts, write today to:

MONSANTO CHEMICAL COMPANY

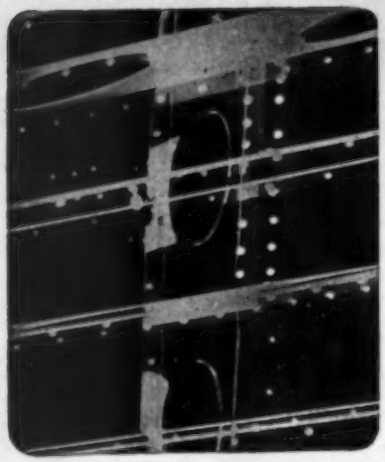
Aviation Fluids
Dept. AF-3
St. Louis 24
Missouri

SKYDROL: T. M. Monsanto Chemical Co.

Monsanto

WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU

Circle No. 111 on Reader Service Card.



let
Aero of Atlanta
extend the latitude
of safety through
X-Ray
Complete X-Ray facilities

AERO CORPORATION
ATLANTA AIRPORT • PO[illegible] 1-7731
ATLANTA, GEORGIA

Circle No. 107 on Reader Service Card.

Bothered by
CUT BACK? STRETCH OUT?
CHANGEOVER?
The answer is
ADAMS-RITE
AIRCRAFT CLOSURE
DEVICES
for LESS LEAD TIME
LOWER COST
PROVEN DESIGNS
CONTRACT PERFORMANCE

Over 90% of America's military and commercial aircraft door and latch closure devices, including all types of locks, latches, handles and tie-down fittings, are manufactured by Adams-Rite. Designed by Adams-Rite's own engineering team and developed to exacting specifications, many may be suitable for your current projects without modification.

A proven way to effect economies and cut costs is to procure standardized components from an experienced, reliable source. Adams-Rite, for over 50 years a supplier of fine hardware, has long taken pride in providing such a source for the aircraft industry. For information, write:
Dept. 127

ADAMS-RITE
MANUFACTURING COMPANY
540 West Chevy Chase Dr., Glendale 4, Calif.

SPOTLIGHT

Republic Aviation's entry in the Air Force off-the-shelf utility jet called for a high-speed jet VTOL transport and was designated AP-90. Design, now reportedly shelved, was to use a General Electric engine and "bending" tailpipe, as distinguished from rotating engines employed by Bell Aircraft.

Sperry Gryoscope, one of the principal suppliers to the Convair B-58 weapon system, has developed and is ready to produce a revolutionary navigation and guidance system for the supersonic bomber.

The Napier Eland-powered Convair 340 has started its CAA certification program at Santa Monica under auspices of PacAero Engineering Corp. Latter company early next year will re-engine with turboprop Elands the Convair 440 recently purchased by D. Napier & Son.

Russia's giant Tupolev Tu-114 turboprop transport is to be on display at next year's international exposition in Brussels, Belgium.

Northrop figures that a 5,000-mi.-range missile or unmanned bomber, such as its SM-62 Snark, can reach almost every corner of the world if launched from the U.S. or Alaska. U.S. sites would cover an area from central Africa, all of South America and the Pacific to New Zealand. Alaskan sites would cover rest of world, except southern Australia and southern Africa.

Rolls-Royce Conway R.Con.11 by-pass jet engine has completed an official type-test at a dry rating of 17,250 lbs. thrust. Previously announced official rating for the engine was 16,500 lbs.

Austria's first postwar aircraft is a four-seater executive model powered by two Lycoming engines. Designed by Erich Meinl, it is to be produced by Simmer-Graz-Panzer AG in the Rax-Werke plant at Wiener Neustadt. Flight tests of the 190-mph aircraft are scheduled to start early next year.

Beech Aircraft is leading the pack in total 1957 sales among the nation's manufacturers of business and executive aircraft. Through October, Beech sales totaled $26.7 million to top second-place Cessna Aircraft's $23.5 million. Piper Aircraft, however, still is top company from standpoint of units shipped, 1,978, followed by Cessna with 1,932.

German Air Force now has 200 Lockheed T-33 trainers. First operational Luftwaffe units, equipped with Republic F-84s, will join NATO next year.

Sud Aviation has given subcontracts to Italy's Fiat company for manufacture of Caravelle tail units, engine nacelles, flaps and ailerons. French company is reported interested in building the English Electric Thunderbird SAM missile under license.

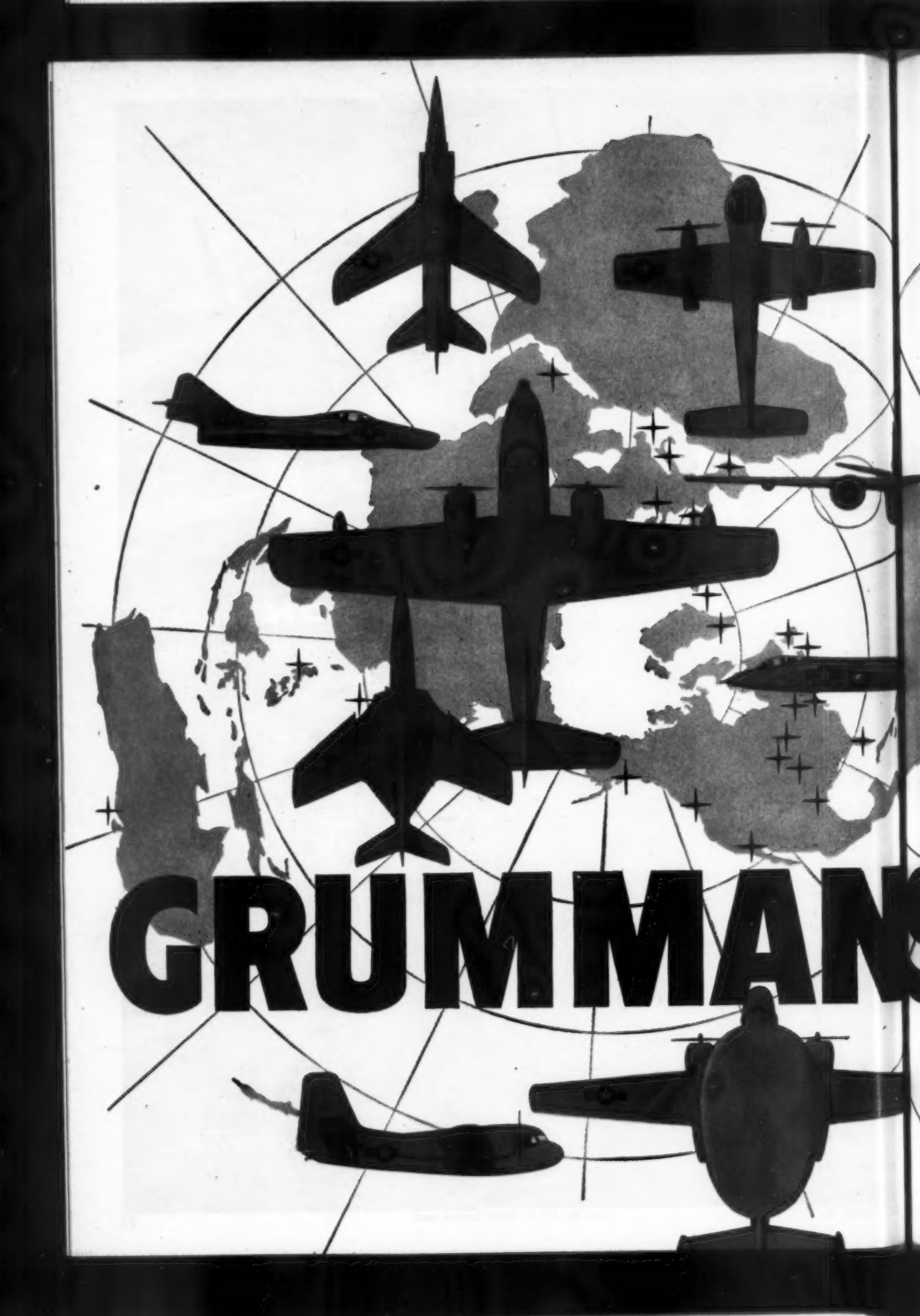
Ford Instrument Co. has received an AMC contract to speed production of its all-weather robot navigators for use in most Air Force combat aircraft. Contract totals $13.8 million, is in addition to early $15 million for automatic navigation systems.

Henry Poetz, who now controls France's Fouga company, is developing a series of powerplants—a 90-hp engine and a turboprop in the 800/1,000-shp category.

Production of the Boeing BOMARC missile will move into a Corps of Army Engineers facility at Seattle, formerly occupied by Ford Motor Co. Meanwhile, construction of four BOMARC launching sites is under way at McGuire AFB, N. J., Bow AFB, Me., Otis AFB, Mass. and Suffolk County AFB, N. Y.

More **THOMPSON** retreads are used world-wide on Viscounts than all other treads

THOMPSON *Aircraft Tire Corporation*


GRUMMAN

What's so special about it? The people who operate Grumman planes all over the world know. It is unsurpassed operational and maintenance support. It's parts. It's intimate technical knowledge. It's highly-trained Grumman representatives on call 24 hours a day. On land. With carriers. It's more operational hours. Fewer maintenance ones. Less maintenance cost, too. It's a many-years record of dependable performance.

Grumman service starts on the drawing board, is inherent in the basic design concepts. It's part of the guts of Grumman aircraft no matter what latitude or longitude they fly. And has been for 27 years.

SERVICE

GRUMMAN AIRCRAFT ENGINEERING CORPORATION
Bethpage • Long Island • New York
Air Superiority Fighters • Anti-submarine Aircraft • Jet Trainers
Air Transports • Nuclear Research • Aerobilt Truck Bodies
Hydrofoil Research • Grumman Boats

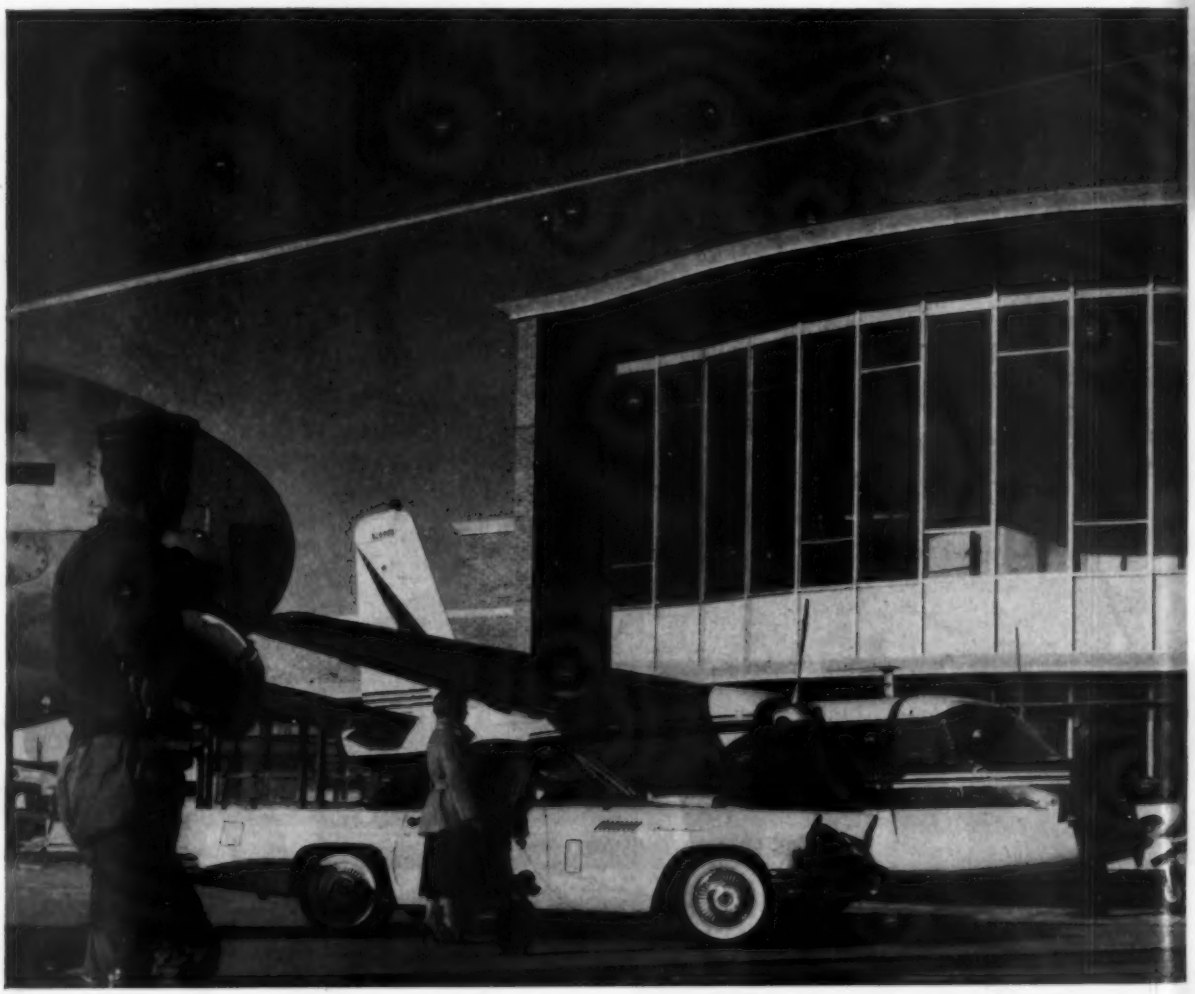
Circle No. 113 on Readers Service Card

SAC Silver Jubilee Newsreel

BY JACK PATTON

AND NOW THE FUTURE
GET THAT DUST SPECK, ESAU.
NOVEMBER 1957 FRANTIC ACTIVITY AS SAC'S NEW TERMINAL NEARED COMPLETION.
WE CAN'T WEAR THESE OLD CLOTHES IN HERE!
SACSTERS FOUND NEW QUARTERS A FAR CRY FROM OLD HANGAR OFFICES.
CURB SERVICE!
AND A CUSTOMERS' CONFERENCE ROOM, TOO.
CUSTOMERS OOHED AND AHHED AS THE WRAPS CAME OFF.
PEEL ME A GRAPE ..... HERMAN.
LUXURIOUS FLIGHT ROOM FOR PILOTS. ANOTHER OF SAC's FAMOUS FIRSTS.

The eyes of Texas and of all the winged world are on AMERICA'S FINEST BUSINESS FLYING TERMINAL. Open this month!



1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Circle No. 114 on Reader Service Card.

TAKCAL®

READS JET ENGINE SPEED to GUARANTEED ACCURACY of 10 RPM in 10,000 RPM (±0.1%)

The inter-relation of RPM to efficiency and thrust in jet engines is fundamental. Proper adjustments for maximum thrust, maximum engine life and maximum safety of operation can be made only upon accuracy of instrumentation. The TAKCAL tests to guarantee that accuracy.

The new B & H TAKCAL incorporates a refinement of the frequency meter principle. It operates in the low (0 to 1000 cps) range, reading the frequency of the tachometer generator on a scale calibrated in percent RPM corresponding to the engine's RPM. It reads engine speed while the engine is running with a guaranteed accuracy of ±0.1% in the range of 0 to 110% RPM. Additionally, the TAKCAL circuit can be used to trouble-shoot and isolate errors in the aircraft tachometer system, with the circuit and tachometer paralleled to obtain simultaneous reading.

The TAKCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from –40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

For full information write or wire...

CHECKS TACHOMETER
"SYSTEM" ACCURACY.
ADAPTS TO ANY FREQUENCY PROBLEM!
Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with ±0.1% accuracy.

B & H makes the *JETCAL*® Analyzer and *TEMPCAL*® Tester

B & H INSTRUMENT CO., INC.

3479 West Vickery Blvd. • Fort Worth 7, Texas

Sales-Engineering Offices:

VALLEY STREAM L. I.: 108 So. Franklin LO 1-9220 • DAYTON OHIO: 209 Commercial Bldg. MI 4563 • COMPTON CAL.: 105 N. Bradfield St. NE 6-8970

ENGLAND: Bryans Aeroequipment Ltd. (Licensee), 15, Willow Lane, Mitcham, Surrey

Circle No. 115 on Reader Service Card.

TITANIUM® RIVETS

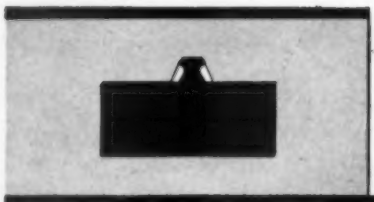
A REMARKABLE SAVING IN WEIGHT WITH NO LOSS IN STRENGTH

Boeing's B-52 Intercontinental Jet Bomber of the USAF's Strategic Air Command gives this nation a retaliatory weapon capable of carrying out nuclear strikes anywhere in the world. Speeds beyond 650 mph, altitudes in excess of 50,000 feet and an unlimited range with refueling, make the B-52 one of the most powerful weapons in recorded history.

Titanium Hi-Shear Rivets are being used extensively in the B-52 and have trimmed hundreds of pounds from the total weight of the airplane. Weight savings of this nature mean longer range, greater speed and better overall airplane performance.

Hi-Shear Rivet Tool Company is now producing Titanium Rivets in large production quantities and a full range of sizes. A comprehensive test program has indicated the fine physical characteristics of this fastener, insuring the continued high precision quality of the Hi-Shear Rivet in this new material.

Write in for details and information on this and other Hi-Shear fasteners.



LEFT — Countersunk head Titanium Hi-Shear Rivet used to fasten skin panels.

LOWER LEFT — Protruding head Titanium Hi-Shear Rivet used to fasten a fitting and flat panel.

LOWER RIGHT — Titanium Hi-Shear Dowel Pins used to fasten two sloped surfaces, eliminating spot facing . . . used on a tubular assembly, conforming to a round surface.

hi-shear RIVET TOOL COMPANY

2600 WEST 247TH STREET • TORRANCE, CALIFORNIA

WHEN—WHERE

DECEMBER

Wright Brothers Lecture, IAS, Dept. of Commerce Auditorium, and Wright **Day Dinner,** Sheraton-Park Hotel, Washington, D.C., Dec. 17.

JANUARY

National symposium on electronics reliability and quality control, Hotel Statler, Washington, D.C., Jan. 6-8.

Annual meeting and engineering display, SAE, Sheraton-Cadillac and Statler Hotels, Detroit, Jan. 13-17.

Yankee Instrument Fair & Symposium, Instrument Society of America, Hotel Bradford, Boston, Jan. 14-15.

Aviation Institute for Commercial Carriers & Business Pilots, U. of Calif., Los Angeles, Jan. 20-Feb. 7.

Miami International Air Show and Exposition, Sertoma Club, Master Field, Opa-Locka, Fla., Jan. 22-26.

IAS annual meeting, Sheraton-Astor Hotel, New York, Jan. 27-31.

Fourth Annual Midwest Welding Conference, Armour Research Foundation, American Welding Society, Chicago, Jan. 29-30.

American Astronautical Society, annual meeting, Engineering Societies Building, 29 W. 39th St., New York, Jan. 29-31.

Southern California Meter Assn., annual instrument short course, Los Angeles Harbor College, Wilmington, Calif., Jan. 30-31.

ASEE College-Industry conference, University of Michigan, Ann Arbor, Mich., Jan. 30-31.

FEBRUARY

Industry-Service Symposium, flight control-panel integration, Biltmore Hotel, Dayton, Ohio, Feb. 3-4.

Reinforced Plastics Div. Conference, Society of the Plastics Industry, Edgewater Beach Hotel, Chicago, Feb. 4-6.

MARCH

ASME Gas Turbine Power Div., conference and exhibit, Shoreham Hotel, Washington, D.C., March 2-6.

National Conference on Aviation Education, National Aviation Education Council, Mayflower Hotel, Washington, D.C., March 13-14.

Nuclear Congress, International Amphitheater, Chicago, March 16-22.

ARS-ASME joint aviation conference, Statler-Hilton Hotel, Dallas, March 17-20.

Interservice and Industry Symposium on Guided Missiles Training Equipment, (secret clearance only), Naval Ordnance Lab., Silver Spring, Md., March 18-19.

IRE national convention and radio engineering show, Waldorf-Astoria Hotel, New York Coliseum, March 24-27.

International Instrument Show, Caxton Hall, Westminster, London, March 24-29.

APRIL

ASME div. of instruments and regulators conference, University of Delaware, Newark, Del., April 1-3.

ASME maintenance and plant engineering conference, Penn-Sheraton Hotel, Pittsburgh, Pa., April 14-15.

ASME design engineering conference, International Amphitheater, Chicago, April 14-17.

HERE AT LAST—THE IDEAL FIELD ATTACHABLE FITTING:

Triple-locked to hose — cannot blow off.
Dynamically sealed — not once, but twice — cannot leak.
Tamper-proof — cannot be loosened accidentally or by vibration.

WILL PERFORM AS DEPENDABLY AS IF FACTORY ASSEMBLED

by trained mechanic under closest supervision — yet
Easily assembled — flared skirt on socket protects hose and hands.
Needs no special skills—no torque wrench required.
Foolproof — parts fit only one way — the right way.

AND IT IS TRULY REUSABLE AGAIN AND AGAIN

Hardened parts keep extra safety factors intact.
Lines made with Seal-Lock Fittings which have been disassembled and reassembled many times still function as well as originally.

ANOTHER PRODUCT OF RESISTOFLEX INGENUITY,

to the standards of Resistoflex Reliability,
for your safety and that of your customers!

Send for Bulletin RF1.

And remember, Fluoroflex-T hose assemblies are now available with either reusable or permanently attached fittings.

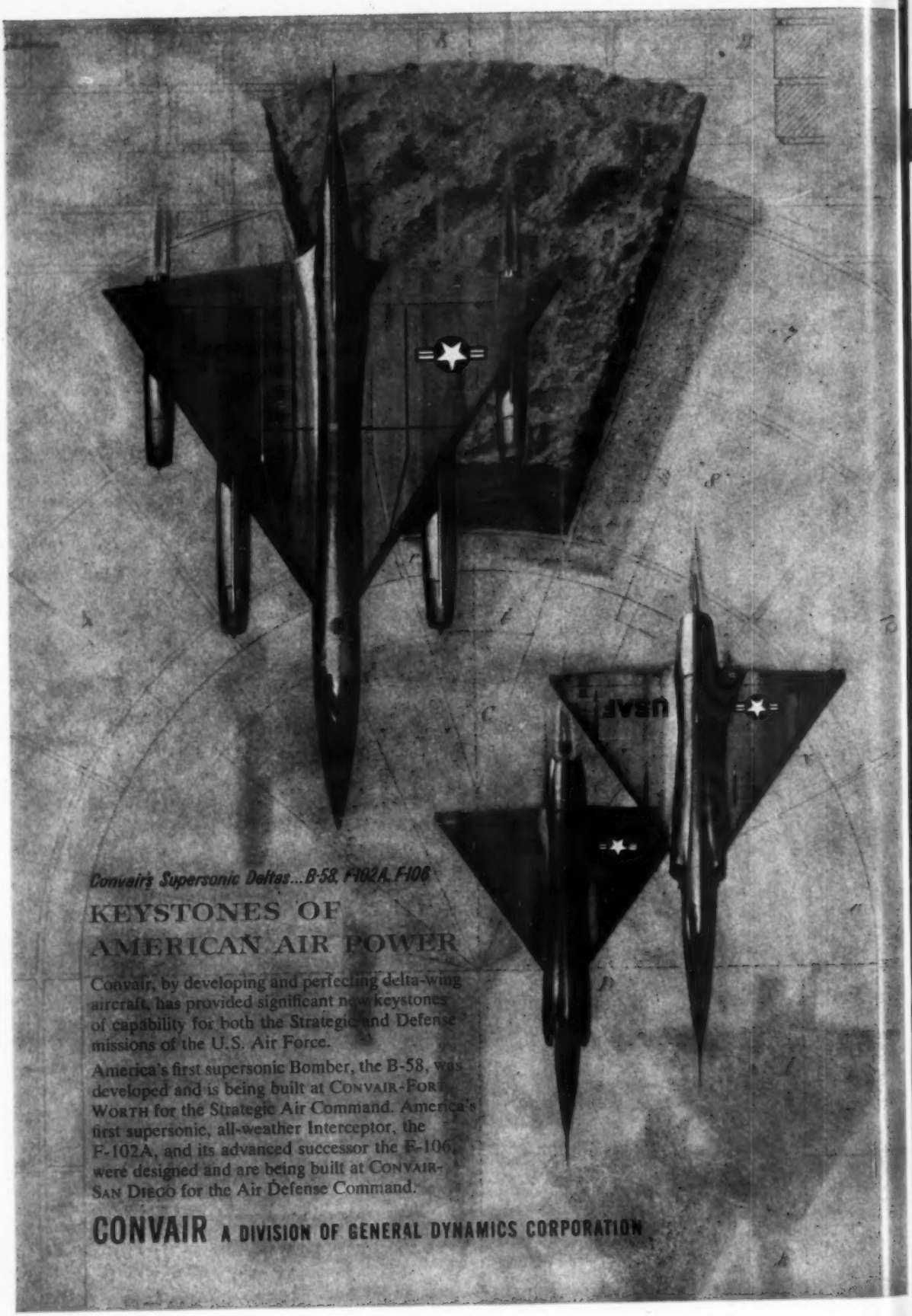
*®Fluoroflex is a Resistoflex trademark, Reg. U.S. Pat. Off. *Trade Mark Patent applied for.*

Resistoflex

CORPORATION

Roseland, New Jersey • Western Plant: Burbank, Calif. • Southwestern Plant: Dallas, Tex.

Circle No. 116 on Reader Service Card.



Convair's Supersonic Deltas... B-58, F-102A, F-106

KEYSTONES OF AMERICAN AIR POWER

Convair, by developing and perfecting delta-wing aircraft, has provided significant new keystones of capability for both the Strategic and Defense missions of the U.S. Air Force.

America's first supersonic Bomber, the B-58, was developed and is being built at CONVAIR-FORT WORTH for the Strategic Air Command. America's first supersonic, all-weather Interceptor, the F-102A, and its advanced successor the F-106, were designed and are being built at CONVAIR-SAN DIEGO for the Air Defense Command.

CONVAIR A DIVISION OF GENERAL DYNAMICS CORPORATION

Washington, D. C., December 16, 1957

AIRTRENDS

Major part of USAF's current fiscal year (1958) program won't be approved finally until after President Eisenhower okays spending plans. Approvals are expected before year's end—the fiscal 1959 budget has to be locked up before Christmas if scheduled messages to Congress are to be delivered on time. Meanwhile, USAF is trying to stretch the $1 billion so far released for obligation for missiles, aircraft and related equipment.

Look for changes in organization and operations of Air Research and Development Command as a result of a study by an ad hoc committee established by USAF's Scientific Advisory Board. Committee chairman is H. Guyford Stever, formerly USAF chief scientist and now teaching at Massachusetts Institute of Technology. An already approved itinerary will take the eight-man group to all research centers and major research installations. Wright Air Development Center will be visited in mid-January.

In attempting to get ready for the space-flight era, Air Materiel Command's manufacturing methods division has gathered a long list of projects for inclusion in fiscal 1959 programs. Projects range from studies of basic industrial processes through electronics and electronic systems, machine tools and machining processes, materials fabrication, plastics, ceramics and optics. Program aims at filling a gap between the laboratory and the production line.

New battle is brewing on Capitol Hill over roles and missions of Army, Navy and USAF. Sen. Dennis Chavez (D.-N.M.), chairman of Defense Appropriations Subcommittee, points out that Armed Forces Unification Act wrote roles and missions into law—Army to defend the land, Navy to control the sea, USAF to control the space over the earth. Sen. Chavez argues that the nation that controls the space over the earth will control the earth. He urges USAF to get on with its job, leaving Army to concentrate on improvement of tactical weapons and Navy the big task of developing a defense against submarines.

Congress won't shove needs of manned aircraft aside in the missile rush. Rep. George Mahon (D.-Tex.), top military purse-string holder in the House, will heed appeals from both sides. A "readjustment and modification" looms, but conventional aircraft will play a major role for years to come, he says.

Congressional investigators will focus on speedup plans for dispersal of Strategic Air Command. A probe ordered by Rep. Carl Vinson (D.-Ga.), chairman of House Armed Services Committee, will lay the groundwork for new legislation under the Military Construction Authorization bill. What probers want to know is how much a reshuffling of SAC bases is going to cost, and how effective the scatter plan will be. They'll also dig into the missile program, stressing expense of launching sites such as proposed $65-million facility at Francis Warren AFB, near Cheyenne, Wyo.

More authority will be given to the Air Materiel Areas as they take over support responsibility for operational missiles and manned aircraft (see page 27). It is expected that AMAs will become weapon system managers as well as managers of the support programs. Big question is whether a single AMA should have responsibility for all engines, including missile engines, with another AMA responsible for guidance equipment, etc.

USAF wants to work with industry in establishing standardization programs. Aim is to halt the burgeoning list of items now in inventory. Effort will aim for the most part at elimination of duplicate common-use items and standardization of materials specifications. There's little chance that standardized equipment will be required in any new weapon system.

Gradual lifting of restrictions on the 2,000-lbs.-thrust Fairchild J83 and GE J85 engines can be expected next spring, as importance of the engines to industry and to Defense Dept. becomes more apparent. Because of emphasis on higher-thrust equipment, these engines were once almost scratched by DOD. Now, however, they reportedly meet definite and as yet classified needs.

DIGEST

AF finally begins fiscal '58 shopping but some contracts will be held up by renegotiation, other factors

The long-delayed USAF fiscal 1958 procurement program will have its first burst of contract activity late in December and into January. But need to renegotiate major cost-type contracts, coupled with Defense Department hold-up on fund apportionment, will delay many contract signings until the second six months of the present shopping year.

USAF will amend major procurement contracts with about 10 of its contractors to incorporate the new Defense order calling for manufacturers on cost-type contracts to finance 20% of monthly payments until final delivery.

The order, now being translated into individual services' procurement regulations, will be applied to all new contracts with exemptions probably going to technical development contracts and small business.

The new regulations are expected to be published early next year. But the Air Force has already begun renegotiations with some of the 10 manufacturers on existing contracts. The Navy, however, does not anticipate amending any present contracts but will apply the 20% requirement to all new contracts.

Also holding up new procurement is the slow release of funds by the Defense Department, held up mainly because of major program changes in recent months—some not yet firmed up. Partial apportionments were made in October, but the bulk of the funds are still to be released. Defense officials hoped to get the balance out this month, but—since the normal flow time from money availability to contract signing is 30 to 60 days—it will be February at the earliest before many orders can be made definite.

However, both the Air Materiel Command and Navy Bureau of Aeronautics have been working around the money hold-up and negotiating with as many companies as possible. Objective is to complete preliminary paper work so contracts can be signed as soon as the money is available.

USAF has put the finishing touches on its manned aircraft shopping list at what it hopes will be the finished form. The list checks in now at under 950 airplanes. It includes 101 B-52s and 18 B-58s under Strategic Air Command's firm priority.

Other programs include about: 120 fighters, mostly Convair F-106s and McDonnell F-101s; 185 cargo and tanker aircraft, divided among Boeing KC-135s and Lockheed C-130s; some Douglas C-133s to carry Atlas missiles; 395 trainers and 35 rescue helicopters.

Navy apparently has its list in similar shape. Although no details were available, BuAer launched its first contract activity with an $86-million allocation to Grumman Aircraft for production of the WV-2 seaplane and a follow-on for the F9F-8T.

Some decisions still hanging fire, indicating loose ends, include final approval for proceeding with the Convair-proposed tri-engined submarine warfare seaplane. Its fate depends on funds available and will be known, after some further juggling, about Jan. 2.

New AF spares system may please budget planners

Air Force expects to have considerably less difficulty in justifying its budget for spares in fiscal 1959. The reason is recent successes in extension of the so-called "hi-valu" and "low-valu" concepts of spares provisioning.

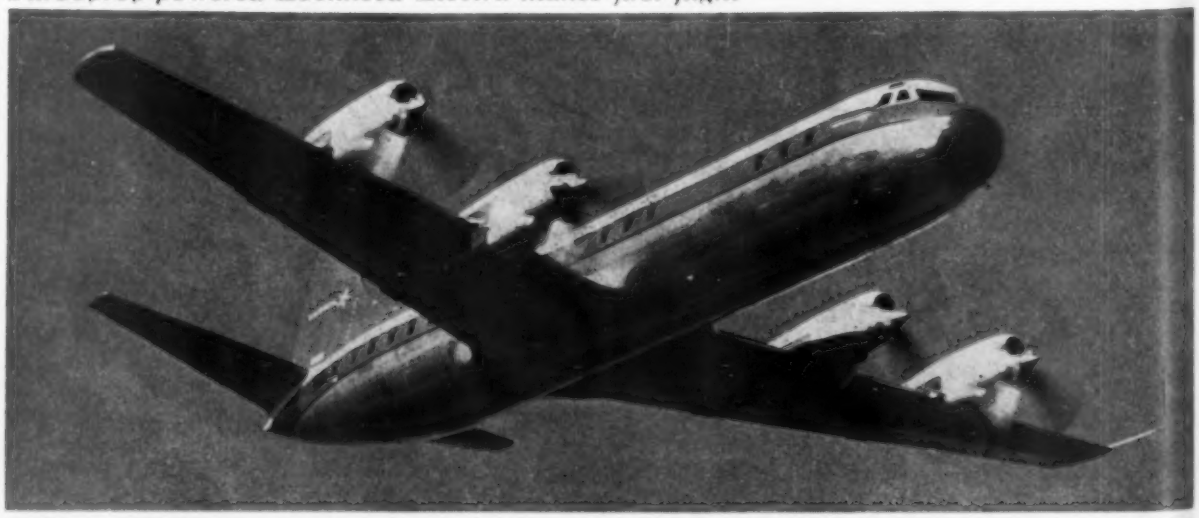
A report now in draft form is expected to categorize the benefits of the program which aims particularly at management of the inventories of "hi-valu" spares. These spares have been divided into two parts—insurance-type and operating-type. In all, the group contains some 14,000 different items, taking most of USAF spares money.

In the case of the insurance-type spares, it is USAF policy to "defer the buy" under an agreement with industry which calls for what is needed off the production lines, until such time as an experience rating determining need can be built up.

Operating-type spares are divided into long-service life and short-service life items, with procurement policy aimed at holding initial purchases to minimum quantities.

Spares in the "hi-valu" categories are assured fast transportation. Storage inventories are segregated and quarterly physical item counts are required. Base repairs must be made within a maximum of 15 days. Contractor and depot repair or overhaul is required in a maximum of 90 days.

Turboprop-powered Lockheed Electra makes first flight



FIRST U.S.-PRODUCED turboprop transport, the four-engine Lockheed Electra, made its initial flight Dec. 6 at Burbank, Calif. The aircraft flew 1 hr., 27 min. with Herman R. (Fish) Salmon, chief engineering pilot, at the controls.

New battles loom in Congress and Pentagon over arsenal vs industry/AF concepts of procurement and production

Behind the existing service jealousies lurks the shadow of a battle which has been fought before and which will be fought again at almost all levels of the Pentagon and Capitol Hill in the coming session of the Congress. It is between two ways of life—the arsenal system on one side and the industry/Air Force team approach on the other.

What is confusing the issue somewhat is the basic Administration tenet that government should get out of competition with industry. Early in the Eisenhower Administration, both Army and Navy, which own and operate some of their own industrial establishments, were asked to show cause why both the arsenals and naval industrial establishments should not be closed.

The results of the service reports were never made public.

Two questions therefore arise: "How can there be any question of choice? Why arsenals?" And perhaps the answers to these questions might have been simple—were it not for the battle between Air Force and Army with respect to IRBMs, and if that battle had not been intensified by the small groups of dedicated men who worked at Redstone Arsenal and at the Navy's Point Mugu, and those who worked with them in universities and private research laboratories.

Historical justification for the arsenal approach or system stemmed from the thesis that without the setting of military standards, industry would take advantage of the soldier, and the Army itself. Later justification came from the claim that industry standards were not good enough for military equipment. Also, there was the argument that an industrial capability must be kept alive in the arsenals and naval establishments between wars because of the industry refusal to participate in peacetime in programs for which mass production was not feasible.

The latest claim is that industry, being geared to mass production methods, doesn't in the first instance produce reliable equipment because it freezes design at too early a stage and allows the production engineers to move in and dictate production feasibility as an element in early design, while in the arsenal the design remains fluid until bugs are eliminated.

In part at least, it was this last consideration that played an important, if not a predominant role in the decision to put both Jupiter and Thor into production. Pentagon spokesmen say that while there is a greater production capability for Thor at this time, equipment conceived under the so-called "team approach" has of necessity a long debugging period during which time Chrysler, the Army's second source, can tool and catch up through use of mass production methods.

History supplies the answer to these claims, according to the advocates of the industry approach. Examples cited are: (1) the failure to produce satisfactory prototype aircraft at Wright Air Development Center when it operated as an arsenal-type operation; (2) the failure of the Naval Air Facility in Philadelphia to produce; (3) the slowness with which even conventional weapons and tanks have been developed in the arsenals, and (4) the problems with service-developed electronic and radio equipment during World War II.

They argue too that many of the early and valid criticisms were eliminated when industry went to work on research programs and developed quality control standards and that, while debugging is frequently needed, the bugs can't be eliminated in the arsenal but develop mostly during operational or combat conditions.

As far as the charge that there is a tendency to freeze design at too early a stage in the development cycle, the argument is that, under current conditions, the development cycle must be compressed and that it would do little good to have a perfect obsolete weapon or to have no weapon at all when a war started.

The answer, according to impartial sources, won't be easy to come by. It may be that the role of the arsenal and research laboratory should be limited to work preceding the production of the first prototype—whether of aircraft or missiles or any major component. Also, it may be that the designer should stay with the job through prototype test but not in a control position, instead being a member of a team whose job it is to produce at the earliest possible time the requirement set by the Joint Chiefs of Staff, with improvements provided where possible in later production models.

Grumman gets Navy awards totaling $86 million

Two contracts totaling $86 million have been received from the Navy by Grumman Aircraft Engineering Corp. for production of the F9F-8T Cougar and the WF-2 Tracer early warning aircraft. The follow-on contracts will push Tracer production into 1960, the Cougar into 1959.

Meanwhile, a Grumman official confirmed that the company's General Electric J79-powered Model 98J (F11F-1F) is being considered by the German Air Force and said the Super Tiger "will handle any fighter or fighter-bomber assignment without need for any extensive modification." The Grumman fighter is one of a number of aircraft, including another U.S. entry—the Lockheed F-104—vying for the German defense role.

Grumman's Tracer contract is in excess of $46 million and is the first for quantity production. The company last year received an $8-million development contract which later was amended with an additional $9 million for initial production.

The F9F-8T contract totals about $40 million, with an undisclosed quantity to be produced and delivered in 1959. President Leon Swirbul said the contracts "will serve to further stabilize our current work force rather than mean a need for a buildup."

Convair's two delta interceptors pose together

CONVAIR F-106A Delta Dart, left, and F-102A Delta Dagger. Notable external differences are vertical stabilizers, engine inlet ducts, and area rule applications. Internally, aircraft differ principally in powerplants and in an advanced Hughes armament system in F-106A. Both carry Falcon missiles. Dart is powered by Pratt & Whitney J75, Dagger by P&W J57.

BRIEFS

Manufacturing-military

Aerojet-General Corp., subsidiary of General Tire & Rubber Co., delivered to The Martin Co. at Denver the first production-type engine for the USAF Titan intercontinental ballistic missile. Aerojet developed and produced the liquid fuel rocket engine at Sacramento under a $55.6-million USAF contract.

Chance Vought Aircraft reorganized its sales setup into two departments. R. V. Lynch, former sales manager, is sales manager-aircraft, and G. M. Monroe, former military sales chief, is sales manager-missiles. Both report to W. P. Thayer, v.p.-sales and service, who will establish a Washington, D.C., office.

Air Force apparently set a new world speed record and captured the Thompson Trophy from Navy last week, but trouble with timing equipment may keep the record from being official. A McDonnell F-101 averaged between 1,170 and 1,185 mph over a 10.1-mi. course at Edwards AFB, using afterburners. Navy record is 1,015.428 mph with an F8U-1. Britain holds official world record of 1,132.136 mph with the Fairey Delta.

George P. Sutton, of North American Aviation's Rocketdyne Division, was elected president of the American Rocket Society. Col. John P. Stapp, USAF, was elected v.p. and the following were named to three-year terms on the ARS board: Wernher von Braun, director-development operations, Army Ballistic Agency; Maurice J. Zucrow, Purdue University, and Simon Ramo, executive v.p., Remo-Wooldridge Corp. Martin Summerfield, Princeton University, was named to a two-year term on the board.

Republic Aviation Corp. has completed evaluation of a portable jet engine noise-suppressor intended for testing engines prior to installation in aircraft, according to announcement by Republic and International Aerocoustics Corp. (Aviation Division, Industrial Acoustics Co., New York). The latter company manufactured the suppressor under license from United Aircraft Corp.

Ames Aeronautical Laboratory of National Advisory Committee for Aeronautics demonstrated a jet engine thrust-reverser which also gives the pilot instantaneous in-flight engine thrust control for improved acceleration under approach conditions such as wave-offs or aborted landings. The tailpipe-mounted clamshell device is hydraulically actuated by pilot control. It is being tested on an F-94C, on which it provides 60% thrust reversal.

Peninsular Metal Products Corp., Ferndale, Mich., has entered an agreement to acquire all stock of the George L. Nankervis Co., Detroit, maker of aircraft testing equipment. Personnel and policies of Nankervis, which will be operated as an independent subsidiary, will not be affected.

Francis L. Hine of Airwork Corp. has been elected president of the Aviation Distributors & Manufacturers Assn. Paul Kennedy of Southwest Airmotive is vice president-distributors and Dee Hollowell of Continental Motors vice president-manufacturers.

William G. Key, former assistant to the president of Fairchild Engine & Airplane Corp. has joined the staff of Vice President Richard M. Nixon as administrative assistant for press relations. He will be succeeded by Louis Davis, formerly manager of public relations for the Engine Division.

General Electric Co., Evendale, Ohio, has received an Air Force contract totaling $3,503,376 for J79 engines for the Navy.

Aircraft and missile industries will use about 15%, or 25 million pounds, of the reinforced plastics produced for industry this year. In 1956, 28 million lbs. were used.

Beckman Instruments, Inc., shareholders have voted to acquire the outstanding stock of Arnold O. Beckman, Inc., of South Pasadena. Shareholders also re-elected the board of directors for the coming year.

Financial

National Airlines reports a net loss of $301,396 for the third calendar quarter, the first quarter of the carrier's fiscal year. This compares with a net profit of $347,733 for the same period a year ago. Total operating revenues for the quarter were $11,-157,039 compared with $11,161,541 last year.

Bell Helicopter Corp. has set a record for commercial sales for the sixth consecutive year. Harvey Gaylord, president, predicts that commercial sales will be 30% higher than in 1956 for a gross value of $10 million. Sales for the first nine months exceeded the total for the entire year of 1956. Eventual goal of the company is $25 million sales in a single year.

Aeroquip Corp. reported earnings before taxes of $4,488,606 on $42,-793,777 sales in the fiscal year ended Sept. 30, compared with $3,993,285 profit on $33,347,747 sales in the previous year.

Capital Airlines' loss for the first 10 months of 1957 totaled $1,168,884, against a $1,899,272 loss in the same 1956 period.

Braniff Airways earned $1,622,000 in the first 10 months of this year compared with $1,730,000 profit in the same period a year ago.

Beech Aircraft Corp. reports commercial sales of more than $35,-700,000 in fiscal 1957, about $5 million more than last year. Orders on hand for 1958 Beech models have passed $14,800,000. Company's commercial sales have increased almost fivefold since 1950.

Transport

K. V. Brugh, Jr., of Greensboro-High Point Air Service Inc., was elected president of the National Air Taxi Conference for the coming year. Other new officers: W. Clayton Lemon, of Lemon's Air Service, Roanoke, Va., 1st v.p.; Julius Goldman, Revere Airways, Revere, Mass., 2nd v.p. NATC members on Sept. 30 completed their second consecutive fatality-free fiscal year, flying 97,540 passengers and 9,045,959 passenger-miles.

Stanley Gewirtz will return to the Air Transport Assn. on Jan. 1 as vice president and assistant to the president, the same position he held before joining National Airlines as vp-administration and corporate affairs. His resignation from NAL is effective Jan. 1.

First Aerobridge built for a commercial customer has been erected by Lockheed Air Terminal at Chicago's O'Hare Field, where United Air Lines will conduct an extensive testing program. The bridge was built for Lockheed by Universal Fabricating Co., Los Nietos, Calif. The entire structure will pivot in a 180-degree arc and is covered to protect passengers from weather.

New President of Northeast Airlines will be James W. Austin, who has resigned as vp-traffic-sales of Capital Airlines. He takes over about Jan. 1. George Gardner, now president, becomes board chairman.

Continental Air Lines consolidated all traffic, sales, public relations and advertising functions in one department headed by Harding Lawrence, whose title has been changed from vp-traffic and sales to vp-executive administration and sales. Stanley Halberg continues as vp-public relations and advertising under the new department.

Obituaries

T. M. O'Connell, general manager of Straits Air Freight Express and inventor of the Cargon system of freight pallets, was killed in the crash of a Bristol 170 near Christchurch, New Zealand, on Nov. 21. R. B. Hamilton, operations manager of Straits, was also killed.

G. Hamilton Beasley, 54, executive vice president and treasurer of West Coast Airlines, died Nov. 22 in Seattle. He joined West Coast in October, 1954, after having been publisher of the Phoenix, Ariz., Times.

Thomas Zell Fagan, 67, director of sales, service and advertising for Scintilla Division of Bendix Aviation Corp., died Dec. 6. Well-known in aviation circles, Fagan started his business career in 1915 as traffic manager of Wilder Tanning Co., Waukegan, Ill., and later became manager of the test lab for Fansteel Products Co. He joined Scintilla Magneto Co. in 1922 as an aviation products salesman and had been with the company, which later became a division of Bendix, ever since.

One of over 250 Joy Axivane Fan Models built to conform to . . . or exceed Army and Navy specifications.

Write for FREE Bulletin 159-8A

BOEING AGAIN SPECIFIES JOY FANS

. . . THE KC-135 AND 707 use Joy fans for a variety of cooling and ventilating jobs. And Boeing was going on solid experience—Joy fans and blowers had proved themselves on the B52 and earlier Boeing craft. This time they handed us some tough assignments. For instance, a lightweight 7.5" dia. blower moves 800 cfm *continuously* at 130°F to cool vital electronic equipment.

20 CFM TO OVER 6000 CFM is the range of Joy Aircraft Fans . . . these high performance miniatures weigh from 10 ounces to 50 pounds. Leaders like Lockheed, Boeing, Douglas, Sikorsky, Grumman, North American specify Joy Axivane Fans. Write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

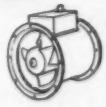
WSW A 6493-158

JOY...EQUIPMENT FOR AVIATION...FOR ALL INDUSTRY

Ground Power Units

Portable Lighting

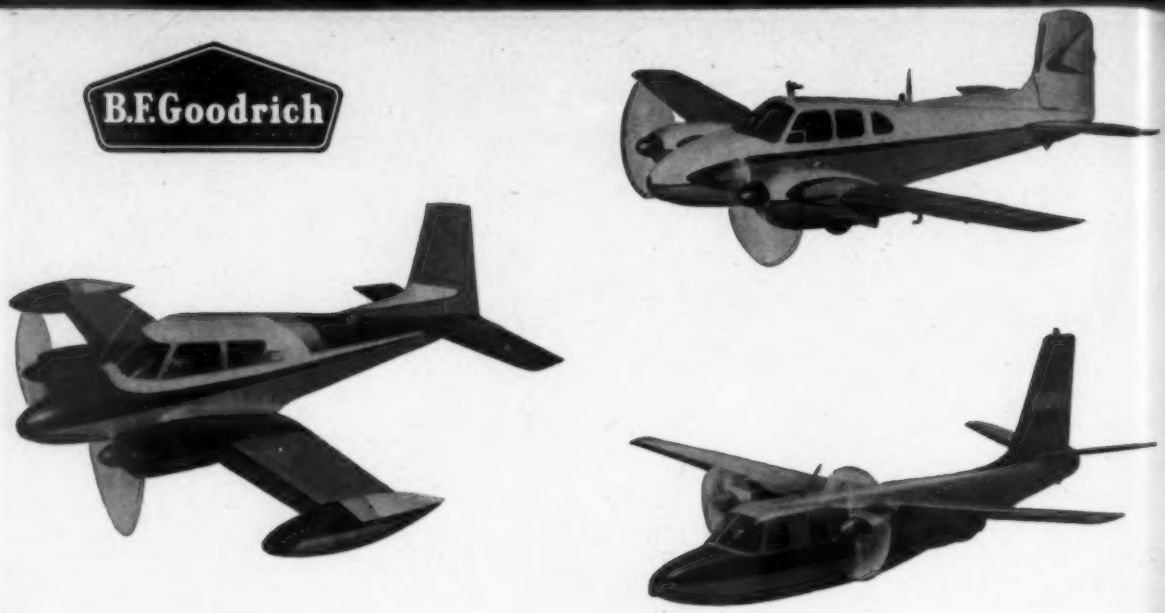
Electrical Connectors



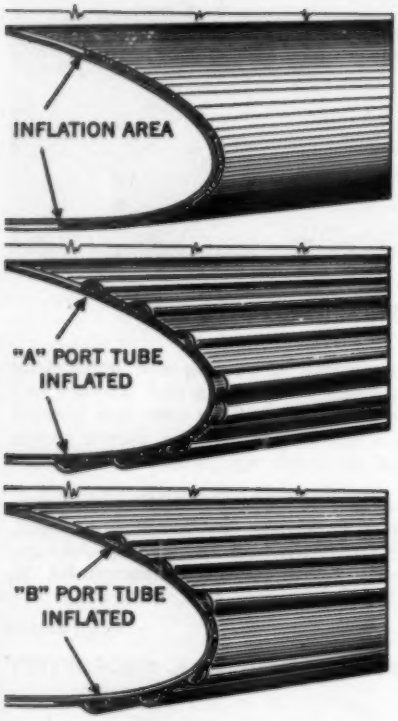
Vaneaxial Fans

Circle No. 117 on Reader Service Card.

B.F.Goodrich



'Winterized' wings keep executive planes flying the year round



FLYING BUSINESSMEN can't *afford* to be grounded. Delays due to icing conditions can mean a meeting missed, a contract lost.

But B. F. Goodrich pneumatic De-Icers eliminate delays—enable executives to plan and complete trips they otherwise wouldn't even schedule. With B. F. Goodrich De-Icers, ice removal is a "snap"! Small tubes inside the De-Icer boot inflate and deflate alternately to crack ice as it forms (see drawings at left). The ice breaks off cleanly, washes away in the air stream. The operating cycle is completely automatic.

You'll find B.F.Goodrich De-Icers on the wings of most multi-engine executive airplanes flying today. Businessmen know they can depend on them to meet tight schedules—at any time of year—in any kind of weather. BFG De-Icers are simply cemented on—without stretching or mechanical attachments. As a result, they fit smoother, are easier to maintain and have a much longer service life.

Installed in sections along the wings, the different sections operate alternately and symmetrically about the fuselage to minimize disturbance of the airflow. The inflation sequence is controlled by either a centrally located distributor valve or by solenoid-operated valves located in the wings adjacent to the De-Icer air inlets.

B.F.Goodrich De-Icers can be ordered as original equipment on planes of the type shown above—the Beechcraft D50, the Cessna 310 and the Aero Commander. Or they can be installed on your present planes by authorized B. F. Goodrich Aviation Products distributors.

For low-cost, year-round protection against ice, be sure to "winterize" your wings and empennage with De-Icers by B.F.Goodrich—inventors of the pneumatic De-Icer and leaders in the field since 1928. Write today for free De-Icer data sheet AD-301.

B.F.Goodrich Aviation Products

a division of The B. F. Goodrich Company, Akron, Ohio

Tires • Wheels • Brakes • Heated Rubber De-Icers • Inflatable seals • Fuel cells Pressure Sealing Zippers • Rivnuts • Avtrim Adhesives • Hose and rubber accessories

Circle No. 118 on Reader Service Card.

DECEMBER 16, 1957—VOL. 21, NO. 15

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Weapons support . . .

Air Materiel Command will take over responsibility from contractors in production stages of both manned aircraft, missiles

by Elizabeth Oswald

THE PROBLEM of support responsibility for new weapons, including missiles and manned aircraft, is taking on major proportions for both the Air Force and industry as the missile era approaches and the planners look down the road towards the manned space weapons of the future. As used here, "support" includes maintenance.

Magnitude of the problem becomes apparent when attention is called to the 300,000-odd pieces which make up one of the average ballistic missiles on which the Air Force is now working.

Basic to current discussions, which deal both with logistic support and maintenance, is the recognition that dollar limitations must of necessity control the level of support possible; and that judgments will have to be made as to how much support is required and at what level, as these weapons acquire limited operational capability.

Gen. Edwin W. Rawlings, chief of the Air Materiel Command, is moving cautiously into the area of support responsibility. As a first step the resources of the huge San Bernardino (Calif.) Air Materiel Area, along with the industrial complex which supports it, are to give first priority to logistic support management for the intermediate-range and long-range ballistic missiles.

However, weapon system management remains with Brig. Gen. Ben Funk, who has worked closely with Maj. Gen. Bernard A. Schriever. The latter will continue to remain responsible for the development of these missiles and technical direction of the Air Force's ballistic missiles programs under Air Research and Development Command.

A little publicized order dated June 28 spelled out the responsibility of both contractors and the Air Materiel Areas for the current families of missiles. A somewhat similar order will be issued shortly for manned aircraft and other major programs.

Overall policy contained in the order applies to all first-line weapons both manned and unmanned, as follows:

Contractor logistic support will normally be used in the research and development stage with the appropriate Air Materiel Area looking over the contractor's shoulder in an effort to find out the answers.

As the weapon gradually moves into production for inventory, the Air Materiel Area would gradually take on the job with contractor assistance so that it will be able to support the first-line weapons during their operational stage. Again, as the weapon became obsolescent, there would be greater reliance on contractor support.

There are two basic promises spelled out for industry in Gen. Rawlings' order, the first being that the takeover from industry will not be sudden. The second is that AMC has no intention of expanding its depot capability, so that, even during the operational life of the weapon, contractors will be given some logistic support contracts.

Still in other cases where, because of limited production or other factors, it is uneconomical to have AMC assume support responsibility, the contractor will remain solely responsible for logistic support.

Under the family plan, missile support is to be provided for Falcon and Sidewinder by Middletown (Pa.) Air Materiel Area; for Rascal and Green Quail (GAM-72) by Oklahoma City; for Matador by Warner Robins (Ga.) Air Materiel Area; for Bomarc, Snark and Bull Goose (SM-73) Ogden, Utah. San Bernardino will be responsible for Atlas, Titan and Thor.

There are special provisions attached in all cases as far as the contractors are concerned. In the case of Falcon and Sidewinder, the contractors will continue to support these weapons until Middletown develops a capability. In the case of Matador, present plans contemplate contractor support for the A and C series with Martin responsible for "analytical overhaul" of the TM-61B (redesignated TM-76A) only and to continue to support this series until Warner Robins develops the

THEY RECOMMENDED switch of future direction of Air Force ballistic missile activities to Strategic Air Command from Air Research and Development Command. From left: Gen. Thomas Power, SAC commander; Gen. Edwin W. Rawlings, AMC commander; Maj. Gen. Bernard Schriever, commander AF Ballistics Missiles Division, and Lt. Gen. Samuel E. Anderson, ARDC commander.

necessary capability.

In the case of Snark, Northrop will be responsible for the first 13 items on a negotiated basis using existing facilities at Hawthorne, Calif. For items between 13 and 120 now on order a plan for support and the degree of support is still to be determined. In case of an order for inventory quantities (more than 120) Ogden will develop an in-house capability.

Bell is to provide the support for Rascal under current plans while in the case of Thor, Atlas and Titan during development of initial operational capability production facilities will be used while depot training takes place and depot maintenance operations are progressively developed.

Informed sources say that this policy has left unsolved many problems including:

(1) The training of the highly skilled personnel who will be required during various stages of test and evaluation.

(2) How far existing facilities of the Air Force or industry can be used.

IAM sets stage for new wage demands

International Association of Machinists AFL-CIO has laid the groundwork for what the union calls "price tag" negotiations in the aircraft and missile industry. The plan calls for a 26¢-an-hour and more wage increase for some 250,000 members.

Major points in upcoming demands are an immediate cost-of-living raise of 13¢ an hour, general wage increase of 6% across the board in all classifications, and additional raises for employes in highly skilled and technical positions. Included also are straight-time hourly rate adjustments to correct job "inequities."

Other demands would cover establishment of relocation and severance pay, a 5% increase in pay of apprentices, and a number of fringe issues to be sought on a local basis.

Crossfield dresses for X-15's first flight

Air Force's latest pressurized suit is designed to take man safely into space.

Developed by the David Clark Co., Inc., of Worcester, Mass. the XMC-2 full-pressure suit will be used by NAA pilot Scott Crossfield during the first flight of the X-15 experimental rocket plane.

Actually the equipment is more than a pressure suit. It consists of several layers of garments, each offering a special protection to the wearer against certain "space" hazards.

Included are an insulating garment for protection against the extreme cold at high altitudes, a ventilating garment for protection in crew compartments overheated during flight, an inflating garment for protection against excessive G-loads, a pressure garment for protection against low-pressure conditions, and an aluminized outer garment for protection against flash fires in the crew compartment and wind after bailout. In addition, the suit includes restraining straps and its own emergency oxygen system.

The pressure garment is reported to be made of a "Chinese weave" which tightens when subjected to pressure. Suit permits full mobility and full protection in event of a cabin blow-out at extreme altitudes.

Chance Vought, Navy win Collier Trophy

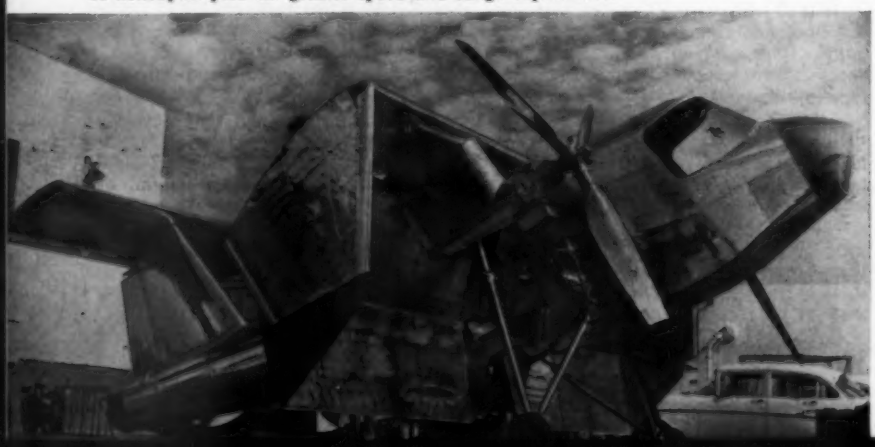
Chance Vought Aircraft and Navy Bureau of Aeronautics are joint winners of the 1956 Collier Trophy Award for conception, design and development of the F8U Crusader.

Edwin A. Link, inventor of the flight simulator and other aviation training devices, won the 1957 Frank G. Brewer Trophy for advancement of aviation education.

The awards will be presented by National Aeronautic Assn. at the annual Wright Memorial Dinner in Washington, D.C., Dec. 17. Charles J. McCarthy, Chance Vought board chairman, and VAdm. James S. Russell, former chief of BuAer, will receive the Collier Trophy for their organizations.

First photo of Ryan turboprop Vertiplane

ARMY/NAVY research vehicle, the Ryan Vertiplane, uses the deflected slipstream principle to give it VTOL capabilities. Powered by a single Lycoming T53 turbine engine located in fuselage, the craft has two wing-mounted propellers. Flaps are shown extended as they would be to provide vertical lift for takeoff, hovering and landing. Wing end plates confine slipstream to flap span. Aircraft is said to have all advantages of helicopter plus far greater speed and range capabilities.



Woodward expands Colorado facility

Woodward Governor Co. of Rockford, Ill. is undertaking a 30% expansion of its Fort Collins, Colo. plant opened two years ago under manager C. Russell Martin.

The Fort Collins facility now employs 172 persons and the company expects this will reach 250 to 300 as soon as a newly-acquired 10,800 sq. ft. addition to the plant becomes operational.

Main production at Fort Collins now involves lightplane propeller governors, but Woodward soon will commence output of governors for jet aircraft constant-speed generators being built by Sundstrand Machine Tool Co., Denver.

Defense says manned bombers still main striking force

by Charles Schaeffer

TOP Defense Dept. officials believe they must rely on the fast striking force of manned aircraft for the next 10 years—and probably longer.

At the same time, weapons planners foresee no radical revamping of the aircraft shopping list for the Strategic Air Command. If they cling to this view, Defense chiefs will carry out development and procurement plans along the lines established. The Pentagon now thinks projected forces of a missile-supported Strategic Air Command are an adequate deterrent to the massive Soviet threat.

Pentagon intentions didn't unfold exactly in this order or in those words before Senate Defense probers. But underlying the testimony by key U.S. military planners and scientists is this theme: SAC momentarily holds a "strategic" edge over Soviet advanced arms developments.

To keep this admittedly narrow margin, weapons chiefs will step up dispersal of world-wide air bases, sharpen the SAC alert status, and multiply required flying hours.

The cold fiscal facts of the new defense budget thrust themselves briefly into testimony before the Senate Preparedness Subcommittee's investigation. But only in a general way. No figures on what it will take to finance a stepped-up missile program were aired.

There is little doubt, however, that missile accounts will be beefed up. A proposal for transfer of perhaps $2 billion to missile coffers in fiscal 1958 repeatedly emanated from Hill leaders.

Despite a dramatic revival of missile interest, there should be no frantic rush to dump in unlimited amounts of cash at the expense of projected aircraft. When the 1959 budget is released, it is expected to provide for necessary funds beyond the missile field.

Growing fears that missile and satellite publicity would overshadow other aircraft defense needs can be put to rest as a result of a second look at Congressional reaction.

What experts believe

In a carefully-developed prospectus, Senate investigators drew from some of the nation's top scientists and military men these defense priorities:

Continued reliance on the striking forces of SAC while this nation develops ballistic missiles of like retaliatory power.

Acceleration of the ICBM and IRBM programs, bolstered by stepped-up expenditures.

An end to damaging interservice rivalries.

A long-range program for wider basic research in advanced weapons, accompanied by a sweeping overhaul of technological training methods.

It is Defense Secretary Neil McElroy's conviction that the U.S. probably leads the Soviet Union in strategic air power. Under the weight of imposing evidence of Russian missile advances, however, he has agreed to push U.S. defense efforts on the premise that America is breathing hard to keep abreast.

The new Defense boss, modest and soft-spoken, firmly refused to knuckle to charges that aircraft cutbacks have watered SAC's retaliatory power. "I am not aware," he told Sen. Stuart Symington in particular, "that SAC's ability to attack requires any restoration of cuts during 1957."

What he will do, McElroy explained, is press a speed-up of dispersal and redeployment of SAC units. And future procurement? Military strategists now regard current production for the major air arm as "sufficient." Consequently, no acceleration of fast aircraft is contemplated, said McElroy.

The Pentagon head declared that all requests to ease overtime bans on ICBM and the Air Force Thor programs had been honored by his office. He said he knew of no similar bids for overtime relief in aircraft production.

Has bonus system broken down?

As hearings warmed, special counsel Edwin Weisl bluntly told Defense witnesses he had been informed bonus incentive contract clauses had broken down. Weisl, a New York lawyer, wondered why officials were neither rewarding nor penalizing manufacturers for early or late weapons deliveries.

South Dakota Republican Francis Case then said he was worried about the same thing. If bonus incentive rules have collapsed, he said, the Renegotiation Act should be revamped. His view, he cautioned, encompassed both sides of the issue—and profits won't be permitted to follow a "sky's the limit" course. Proposals for extension of the Act will be heard next year.

But even before then, McElroy promised, a searching inquiry of the incentive contracting system will be ordered.

Out of the hearings came multiple proposals for divorcing war strategists from the Joint Chiefs. How far these plans will go is anybody's guess, but it is clear politicians want dramatic action to end interservice rivalries.

They listened closely to proposals by Dr. Vannevar Bush, chairman of the board of the Massachusetts Institute of Technology, and Lt. Gen. James Doolittle, chairman of the National Advisory Committee for Aeronautics and the Air Force Scientific Advisory Board.

Dr. Bush, wartime Director of the Office of Scientific Research and Development, told probers he would like to see a central planning board authorized to make unified defense plans. Gen. Doolittle recommended a board of young, objective military advisers assigned to the Defense Secretary.

These recommendations, the witnesses said, might pave the way for a unanimity the Joint Chiefs have not achieved.

For three hours the lead-off witness, bushy-browed Dr. Edward Teller, virtually hypnotized the subcommittee with his humor-flecked testimony. He philosophized about the role of the scientist in society, the need for sweeping educational reforms and about lunar journeys.

Finally, the Hungarian-born nuclear scientist recommended a multipoint U.S. defense program, revised to void Soviet gains. Crowning his proposals was a call for a piercing examination of the retaliatory power of SAC. Dr. Teller urged a speed-up and expansion of IRBM and ICBM projects and the prompt development of a system of food-stocked, atom-proof civilian shelters.

Chairman Lyndon Johnson (D-Tex.), throughout the early phases of the investigation, reminded witnesses and the subcommittee that Defense officials lack "a sense of urgency." It was the job of investigators, he said, to restore this atmosphere—not fix blame.

An early order to start Air Force and Army IRBM production was disclosed during hearings and it can be attributed, partially at least, to mounting Congressional demands for action. Some key weapons technicians doubt it was the wisest choice, but Congress holds the pursestrings.

Human Factors

CAA flight surgeon proposes 'modern' physical exams for civilian pilots

A revision of current CAA physical examinations for pilots and a system of limited physical certification is proposed by Dr. James H. Britton, regional flight surgeon for the CAA's Fourth District.

Dr. Britton says many examinations are worthless because there is no follow-up.

In some states, which recognize the practice of medicine by other than licensed doctors, the existing policy of "any doctor" can result in a physical examination by "faith healers and naturopaths, etc."

The CAA physician told the third annual symposium of aviation medicine that a controlled follow-up is required to create actuarial tables that, in turn, will validate decisions made at the time of physical examinations.

Noting that most of the physical requirements were first set on paper for civil aviation in about 1926, Dr. Britton declared that a modern program of study and evaluation must be established to determine a pilot's job description.

With this as a starting point, he said, it then would be possible to determine exactly what physical qualifications a civil pilot must have.

It would enable a standards board to decide whether or not color-blindness is important—important in the traditional concept of red-green-white aviation lighting—if a potential pilot could distinguish between them, regardless of the colors he (or she) saw. As an example, one color could be shown as a blinking light to obviate color discrimination.

In another example, Dr. Britton asked if it is necessary that a civil pilot have all his limbs, since special combined controls are available to do the work required to fly most light aircraft. He said that limited licenses have been granted to six deaf mutes.

Persons subject to heart disease or diabetes may be able to fly safely under certain conditions, he said.

Dr. Britton proposed an expansion of the limited certification system for civilian pilots.

If put into effect, such a system would supply the CAA with an experience record of the group's capabilities "rather than sitting on your hands and saying what they can't do."

"It would offer a fund of statistics that would be more valuable than any other thing we could do," he declared.

Key man in Dr. Britton's program is the medical examiner, plus specialist consultants to whom the examiner may send cases if he does not feel qualified to make a final decision.

Citing the example of a pilot applicant with a "cardiac murmur," Dr. Britton said that this statement alone should not be a cause for rejection, but the location, intensity, etc., of the condition must be diagnosed, usually by a specialist, before final acceptance or rejection can be made.

"Proficiency in actual flying is the final answer," he declared, "we must develop new methods to test the aptitude to fly."

The CAA examiner believes it unfortunate that most of the civilian standards have been taken from the military's requirements, because civil problems are different.

"Anyone has the right to fly," he said.

"If we look forward," he concluded, "next year we can have a limited certification program and in five years we'll have some figures. In 10 years the examinations will be no more difficult than a driver's license and the driver's license will be twice as difficult as the pilot's exam—as it should be."

Speed no problem in supersonic flight, but vision is, Navy F8U pilots say

Pilots of supersonic aircraft are "beginning to become students of their profession," says Capt. Ashton Graybiel of the Navy's School of Aviation Medicine, Pensacola, Fla.

Interrogation of 23 F8U pilots, aged 23 to 33, disclosed that most of them felt that supersonic speed, per se, is not too much of a problem. They realize how fast they are going only when there is a reference object present. This is particularly true at high altitudes.

Some, however, said their "speed sense" was lost. A few felt they were "just hanging there, with the earth passing under us."

One pilot's reaction to speed was: "After all, it's just a function of time."

Some pilots, asked whether they had enough time to do what they had to do, replied that they felt "pressed." Others said it was simply a question of planning.

One calm type stated time was no problem—"I've always had at least two seconds in which to make a decision."

All the pilots agreed that they had visual problems at high altitudes. They could not pick out another plane at high speeds and altitudes unless it was within two miles. Formation flight at high altitudes was said to be difficult because the clear air "makes you feel you're right on top of another aircraft."

Expanding on these thoughts, Graybiel says vision at altitudes is a "real problem," and space myopia, as it is called, needs further investigation.

Some of the pilots felt it was difficult for them to maintain the proper flight attitude at high altitudes without watching their instruments.

The Navy aeromedical specialist says this is not serious if a pilot can orient himself with a quick glance at his instruments. But for others, it may prove a major hurdle.

Inputs from the two basic sensory sources for orientation, visual and gravitational, vary considerably from man to man. In general, the visual outweighs the gravitational. However, a sufficient amount of Gs can affect the visual senses and generate a "false" impression of attitude.

Most of those interviewed agreed that the F8U created no special problems in orientation or vertigo.

The interviews showed marked differences between older pilots and the "tiger types." The older men did not like to go beyond a point where they thought the equipment would operate with safety.

"This represents caution, not fear or anxiety," Graybiel explains.

From the standpoint of fatigue, the majority felt the F8U is no more tiring than any other supersonic aircraft. Some said it was less tiring to fly than low-performance aircraft, because they could "get above the crowd."

All agreed that physical fitness is an important factor in supersonic aircraft operations. Many expressed the desire for a positive program of physical education.

Westinghouse receives new J34 follow-on order

Westinghouse Electric Co. has received a stepped-up order from Navy for J34 engines under a new $9 million contract in addition to an earlier $17 million order (AMERICAN AVIATION, Nov. 18, p. 23).

New order is for J34-WE-46 engines for the North American T2J trainer. The earlier award was for J34-WE-36 engine and for further development, tooling and initial production of the trainer's power plant through 1958.

Vertol says turbines boost H-21 payload 40%, speed 50 mph

New copters, powered by twin turboshafts, can perform twice as much work as single-engined craft

Vertol Aircraft Corp. and the Army are testing two versions of the H-21 helicopters with twin turbine engines replacing the single piston engine. Both types and a "plush" executive configuration of the Vertol rotocraft were demonstrated at the Pentagon Heliport, Washington, D.C.

One of the copters, a company-owned H-21, is powered by two Lycoming T53 turboshaft engines designed as a kit to replace the single Lycoming-built Wright R1820 engine. Only minor modifications of the airframe are necessary and the same engine-mounting attachments are used.

The other turbo-copter is a standard Army H-21 fitted with two General Electric T58 turbines. This version has the engines mounted in tandem and the project is under the Army and Navy Bureau of Aeronautics contract.

Both helicopters had been flown 200 miles cross-country from the Vertol plant at Morton, Pa., to Fort Eustis, Va. They were on the return leg of the flight when they stopped at the Pentagon.

Vertol officials say that the twin turbines give the H-21 a 40% increase in payload and a speed increase of 50 mph.

"This means the helicopter can do twice as much work in a given period of time," Harry S. Pack, Vertol vice president said. "The use of high-power, lightweight turbines provides twin-engine reliability, less vibration and noise."

Pack added that the turbine-kits offer a simple and comparatively inexpensive way for either military or commercial customers to increase greatly the utility of their aircraft and to extend life. Vertol, he said, is ready to offer turbine kits designed around either the General Electric or Lycoming engine.

T58 engines were the first to be used on the Vertol helicopter. First flight was made in September. The tandem arrangement is not standard. The kit will be offered with the engines mounted side-by-side as in case of the Lycomings. Earlier thinking did not favor the side-by-side arrangement of the engines because a thrown turbine wheel could disable both engines. However, Vertol engineers pointed out that the engine manufacturers have built the engines to "contain" any broken parts.

Vertol has had the T53 engines for about a month. Lycoming officials point out that they were placed in the helicopter without previous multi-engine tests and completed the 10-hr. tiedown test in 11½ hrs. The T53 version H-21 first flew in mid-November.

The prototype of the Vertol Model 44C, executive transport helicopter, carries 10 passengers and a crew of two. Included in the "plush" arrangement are a lavatory, coffee bar and refreshment bar, tables, radio and reclining chairs.

The piston-driven executive model was demonstrated at the Pentagon to contrast the two turbine versions. The turbine types are noticeably less noisy from the outside and the rotor noise seems to come from the rotor blades. The executive model is relatively quiet inside and passengers are able to enjoy music over the helicopter's PA system.

Performance data for turbine-copters

	T53 Powered	T58 Powered
Empty weight	8,700 lbs.	8,600 lbs.
Normal gross weight	14,700 lbs.	14,700 lbs.
Payload	5,900 lbs.	6,000 lbs.
Alternate gross weight	16,200 lbs.	16,200 lbs.
Payload	7,400 lbs.	7,500 lbs.
Maximum speed	130 mph	130 mph
Cruise speed	120 mph	120 mph
Ceiling	12,000 ft.	12,000 ft.

ARMY H-21D helicopter is powered by two General Electric T58 turbine engines mounted in tandem fashion instead of the single Lycoming R-1820 piston engine. This model and Vertol Model 105 were demonstrated at Pentagon Heliport.

VERTOL MODEL 105 is an H-21 helicopter powered by two side-by-side Lycoming T53 turbine engines in place of single Lycoming R-1820. Turbine power-package is designed for retrofit into existing H-21s.

Fiat proposes six-place copter with free turbine

Aviation Division of Fiat, Turin, Italy, has disclosed first details of a proposed six-passenger utility helicopter capable of lifting a useful load of one and one-half times its empty weight.

The Italian design proposal, identified as the Fiat Model 7002, emphasizes simplicity of construction, ease of maintenance and reliability. Key factor in achievement of these features is planned use of a single Fiat 4002 free-turbine type powerplant as the gas generator, driving a two-bladed tilting rotor through a pneumatic transmission which ducts compressed air to rotor-tip nozzles.

This eliminates the conventional main rotor gear box with its inherent complexity and reputation for heavy maintenance requirements. The free turbine simply drives a separate air compressor for rotor-tip propulsion. The tail rotor drive is geared to the main rotor mast.

Arrangement of the pneumatic rotor transmission ducting is similar to proven designs in the British Fairey Ultra Light helicopter and France's Sud Aviation Djinn. However, the free-turbine-driven compressor, such as employed in the Fiat proposal, characteristically provides greater performance flexibility with lower fuel consumption than a fixed turbine.

The Model 7002 also includes a shrouded tail rotor for full maneuverability during autorotation or operations requiring low forward speeds.

Detail design of main rotor blades calls for incorporation of air ducts to the tip nozzles routed via a welded stainless steel sheet leading edge and spar. The two blades are joined across a tilting hub by tension strips which resist centrifugal loads while permitting pitch changes.

The Fiat 7002 is designed to handle a pilot and up to six passengers or equivalent payload in cargo.

Specs on Fiat Model 7002

Powerplant	Takeoff	Maximum continuous
Equivalent gas hp, rotor-tip nozzles	530	500
Compressed airflow	7.50 lbs./sec.	7.37 lbs./sec.
Pressure ratio, rotor-tip nozzles	3.0	2.8
Fuel tank capacity	138.8 U.S. gals.	
Dimensions		
Rotor diameter	36.37 ft.	
Fuselage length	20.08 ft.	
Maximum height	9.45 ft.	
Blade chord	16.95 in.	
Fuselage height	6.24 ft.	
Weights		
Normal gross weight	3,087 lbs.	
Useful load	1,764 lbs.	
Empty weight	1,323 lbs.	
Performance		
Max. speed, sea level	105.6 mph	
Cruising speed, sea level	83.9 mph	
Service ceiling	11,160 ft.	
Operating range	186.4 miles	

MODEL shows simple design of proposed Fiat six-passenger helicopter.

British develop new copter simulator

LONDON—A new helicopter flight simulator has been designed by the research department of Short Brothers and Harland, Belfast. In an advanced stage of development, the prototype has been operating for some time. The simulator enables pilot trainees to practice night and instrument flying and to carry out emergency drill, including autorotative landings.

Most of the sights and sounds of flight and the actual physical sensations of hovering and banking are simulated. Takeoff, climb and forward flight are reproduced by a large three-dimensional landscape which is thrown on a bowl-shaped screen by two projectors.

These operate on the shadowgraph principle, using a specially designed filament lamp as a small concentrated light source to cast on the screen the shadow of a color transparency.

The cylindrical horizon projector is positioned below the cockpit. It is painted to show a level skyline, with distant landmarks to serve as reference points. It can be varied to show fields and woods or a seascape, either in daylight or at night. It is electrically operated and moves in synchronization with the pilot's controls.

The landscape projector, mounted above the cockpit, is a circular three-dimensional transparent color model. The lamp is positioned close to the plate to give a scale height of about 8 ft. but variation of vertical "speed" can give the impression of climbing to heights up to 800 ft.

The prototype landscape includes a concrete landing strip with hangar and windsock, surrounded by typical countryside with trees and occasional buildings. Movement of the model is effected by electric servos controlled by velocity signal from a computing system consisting of a network of electrical and electro-mechanical units, interconnected to represent the behavior of the helicopter and working in conjunction with a control console.

The Short simulator, it is claimed, can enable any large organization operating helicopters to establish a pool of qualified pilots and to complete their training more quickly, more cheaply and with greater safety than by normal training methods.

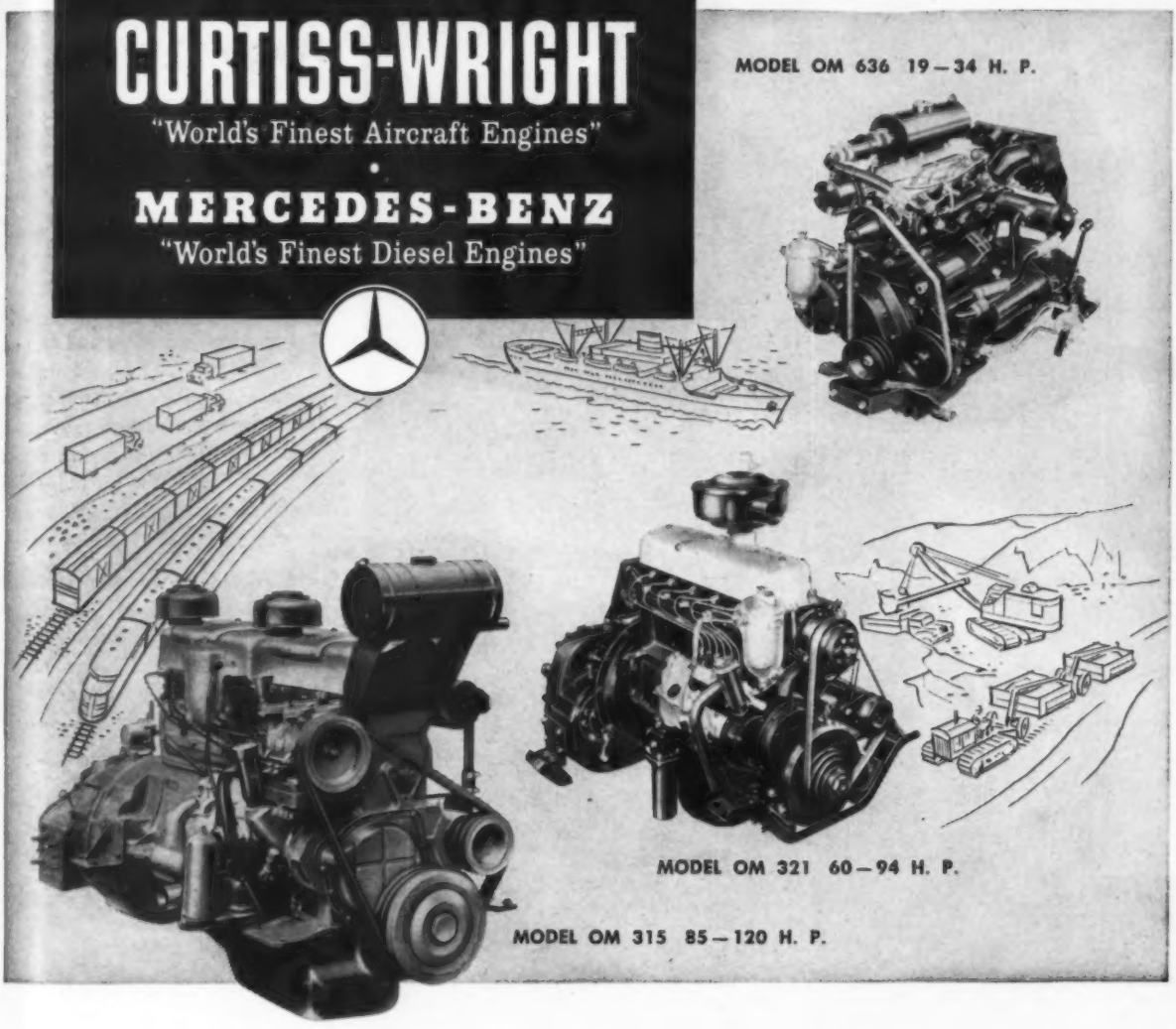
Engineering group urges better aviation lighting

New airborne and ground lights to provide greater visibility and prevent collisions, and better cockpit lighting for instrument landings have been called for by the aviation lighting committee of the Illuminating Engineering Society.

The group called for appropriate government agencies to survey new equipment available and urged airlines and pilot organizations to call for such action.

Flashing position lights with beams visible for 20 miles were described as being available for airborne use and 1,000-watt landings lights were said to be feasible. Improved runway lighting was also described.

Now teamed for Diesel Leadership

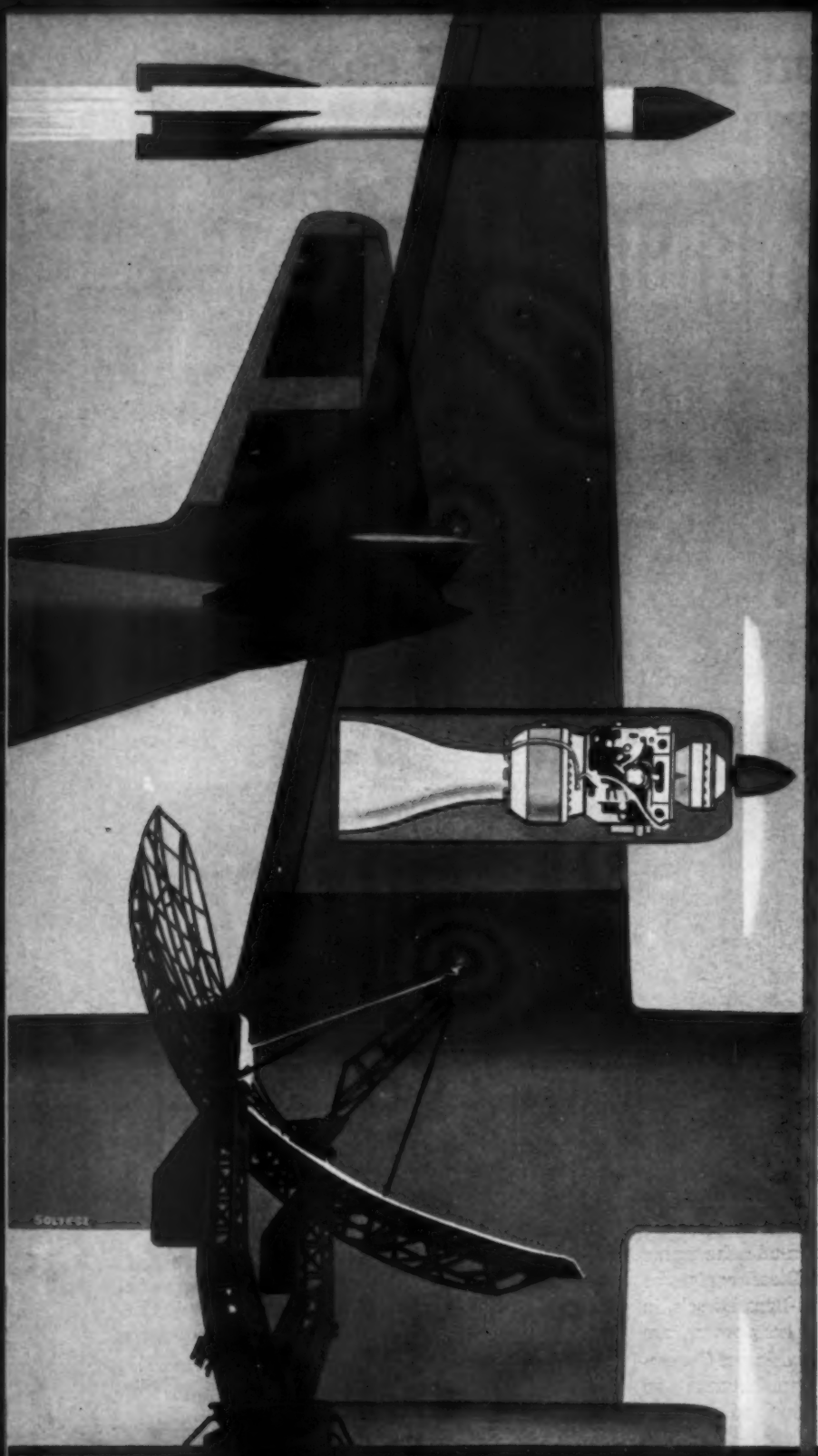


Dependability . . . superior performance and economy . . . maximum power-to-weight ratio . . . these are some of the features that have made the name Mercedes-Benz world-famous – in Diesel engines as in fine automobiles. Now, Mercedes-Benz Diesels, in models ranging from 19 to 3,000 horsepower, are available through the Utica-Bend Division of Curtiss-Wright Corporation, for use by manufacturers and users of industrial, marine, construction and materials handling, transportation, electrical generating, agricultural, oil and gas equipment and vehicles.

The Utica-Bend Division has factory sales and service offices in key areas and maintenance personnel trained at Daimler-Benz, A.G. in Stuttgart, West Germany, to assure full maintenance and spare parts stocks for all users of Mercedes-Benz equipment.

For complete information on Mercedes-Benz Diesel Engines, write on your business letterhead.

UTICA-BEND DIVISION
CURTISS-WRIGHT
CORPORATION • UTICA, MICHIGAN



Avco makes things better for America

AVCO

Avco today

Avco makes things better for America

Avco is a builder of quality products for the commercial economy and high-performance military systems for national defense. Gas turbine and reciprocating aircraft engines, electronics systems, farm implements, kitchen components and the Nose Cone for the Air Force Titan Intercontinental Ballistic Missiles are being produced by Avco *today*.

There are many products that identify Avco. All of them display distinguishing characteristics of Avco workmanship... skill, dependability, resourcefulness. And Avco's first order of business is to make things better for America.

THIS IS AVCO

Avco today is a diversified organization whose products include aircraft power plants and structures, electronics for defense and industry, and specialized home and farm equipment.

Avco's divisions and subsidiaries are:

Lycoming—aviation, marine and industrial power plants . . . Crosley—electronics systems and aircraft structures . . . Research and Advanced Development . . . American Kitchens . . . New Idea and Ezee Flow—specialized farm equipment . . . Crosley Broadcasting Corporation . . . Moffats Limited (Canada)—commercial gas and heating equipment.

Avco Manufacturing Corporation
420 Lexington Avenue, New York, N.

California company develops new process for 'hot-spinning' titanium alloy

A new process for hot-spinning thick titanium alloy (6A1 4V) has been developed by Titanium Fabricators, Inc., Burbank, Calif. Said to be economically suitable for production quantities, the process and special machines were created by TIFAB as part of a contract for Convair-San Diego.

Designed originally for the fabrication of lightweight pressure vessels in missile applications, the method is said to have wide general application in other facets of the aircraft industry.

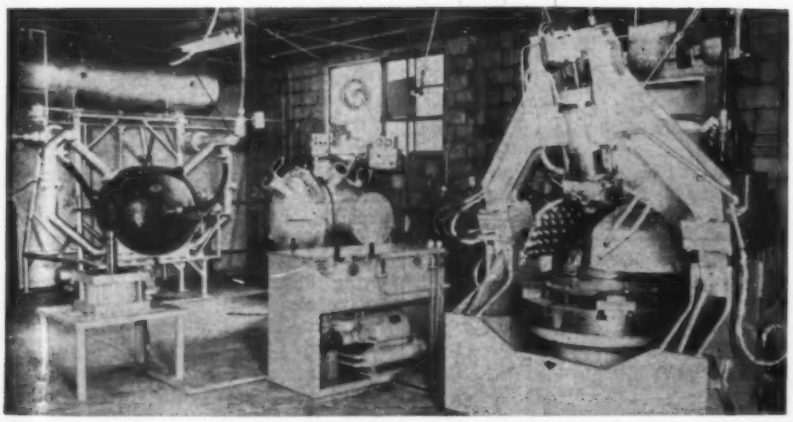
In the forming of hemispheric pressure vessels, the company believes that hot-spinning is more economical and more easily controlled than deep-drawing. Expensive dies and tooling are eliminated.

TIFAB has developed a completely hydraulic vertical spinning machine with controllable feeds, speeds and pressures that can exert as much as 12 tons of pressure on the area being formed. Special attachments have been devised to scarf or machine the metal edges after final spinning.

If contour machining is desired, all that is required is to remove the spinning tool and attach the machining tool.

For the welding operations, the entire vessel is submerged in an inert atmosphere and the welding is accomplished semi-automatically. Following this, assemblies are placed in a special heat-treat vacuum chamber at room temperature, vessels are heated and water sprayed on the vessel instantly and evenly.

The new method is said to be technically suitable and economical for long or short runs, and adaptable to prototype or experimental use.



VERTICAL SPINNING MACHINE at right was developed by Titanium Fabricators, Inc. in new process for hot-spinning thick titanium alloy. At far left is heat-treat chamber in which vessels are heated in vacuum and quenched. In left foreground is small hydraulic press. Weld chamber is in center.

New riveting machine moves to part instead of requiring part to be moved to machine

Douglas Aircraft Co. is using a new riveting machine said to allow quicker and more efficient riveting to the close tolerances specified for the DC-8 jetliner.

The machine, developed by Douglas engineers, brings the riveting operation to the part rather than moving the part to a stationary riveting position. Thus, no extra floor space is needed to accommodate movement of the part.

For example, a wing or fuselage section on a platform is placed between rails of a gantry. The riveting yoke is moved down one side of the panel, upsetting and shaving each rivet. At the end of the panel, the yoke is reversed and the opposite side of the panel is completed. The panel is not moved until the job is finished.

This system of riveting was conceived by T. S. Crispin, tooling administrator of the Santa Monica Division. The machines are manufactured under license by Manco Mfg. Co., Bradley, Ill.

The Manco-Crispin riveter is essentially a large mobile machine in which a yoke containing the riveting equipment freewheels over the panel. It is triggered into the approximate working position by an operator using air motors.

The yoke containing the riveting and shaving tools is easily positioned by hand over the rivet location. The immediate riveting area of the panel is automatically maintained at an angle of 90° to the axis of the riveting anvil by a sensing unit.

An automatic cycle starts with the bottom cylinder containing a pressure foot rising to work. This exerts a clamp force to squeeze the panel upward against the head of the rivet. Rising within the lower cylinder, a rivet gun upsets the rivet against the anvil and retracts. Its place is taken by a shaving mechanism that removes excess rivet metal to close tolerance. After the shaver retracts, the yoke is moved to the next rivet location and the cycle repeated.

C-W operates giant steel-extrusion press

What is believed to be the world's largest horizontal steel-extrusion press, able to produce a wide variety of solid, intermediate and hollow sections, including tubular products and intricate shapes, is now operating on a production basis at the Metals Processing Div. of the Curtiss-Wright Corp., Buffalo, N. Y.

Extrusions are made from cast billets. All modern materials, including stainless steel, chrome moly steel alloys and titanium can be worked, according to Curtiss-Wright.

Developed for the company by Loewy-Hydropress under the Air Force's heavy press program, the press is a three-cylinder design and provides three pressure steps—4,000, 8,000 and 12,000 tons capacity. It weighs 2.5-million lbs., is 126 ft. long, 22 ft. wide and 20 ft. high.

As an example of the work that can be done on the press, the manufacturer showed a 46-foot length of heavy wall tubing, said to have been extruded under 12,000 tons load in just seven seconds. Tubing can be made in diameters up to 20-inch outside diameter, with virtually no restriction on wall thickness, according to the company. Weld-free seamless heavy wall tubing, extruded from stainless and chrome moly steel alloy billets, is available in lengths up to 60 ft.

Convairs speed up CAA flight inspection program

BUSINESS FLYING

New all-metal Piper Comanche features major design changes, improvements

by George Shaw

THE NEW PIPER COMANCHE, first all-metal member of the Piper line, departs radically from its predecessors in two major areas—airfoil and tail assembly. It is the first time a Piper plane has used a laminar-flow wing, and the first to be equipped with the stabilator and swept tail.

Engineering-wise the explanation for these design changes is complicated, but the basic reason is much simpler.

The Comanche's chief design engineer explained that a low-drag, high-lift wing was desired for the comparatively low horsepower planned for this model, and also this type of airfoil would allow for placement of the wing to obtain a wider CG range. All passengers in a fully loaded Comanche are directly over the wing, eliminating problems of balance and trim found in the Tri-pacer.

In addition, the wing is mounted farther aft than usual with Piper aircraft, giving the pilot almost straight-down vision along with the controllability features that prompted the design.

The tail group follows through as an adjunct to the low-drag, high-lift requirement in the original design.

All designs of conventional stabilizers were discarded because of size and weight factors, and it was for these reasons that the stabilator design was adopted.

Fuel capacity 60 gallons

The Comanche's rubber fuel tanks are mounted inboard in each wing, with a total capacity of 60 gallons. The noticeable forward-canted fillet effect at the wing roots adds five gallons fuel space to each tank, raising the capacity above the standard 50 gallons originally planned.

Landing lights are mounted in the wingtips. The main spar in the wing, extra deep because of the laminar-flow airfoil's thickness, goes all the way through the fuselage. This arrangement gives added strength and also saves production time.

Flight controls are similar to those in the Apache, while the brake handle and flap control are the same as the Tri-pacer's. Oddly enough there is no feeling of back pressure on the Comanche's flap control as there is in the Tri-pacer. In the Comanche the handle comes back almost too easily to the full-flap position.

Flying the Comanche is conclusive evidence of the soundness of this latest Piper development. On a cross-country flight from Washington to Lock Haven (Pa.), and back, I had to keep reminding myself that I was not flying an Apache—that this was an entirely new airplane, and a single-engine rather than a twin-engine plane. (Powerplant on the Comanche is the 180-hp Lycoming 0-360 A1A.)

More sensitive controls

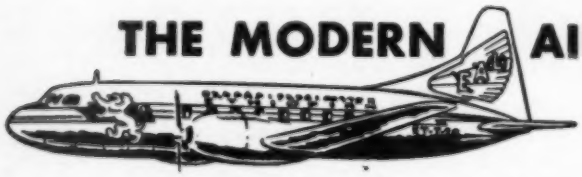
The Comanche is quite a bit more sensitive on the controls than the Apache, especially in respect to setting rudder trim for prolonged straight and level flight such as cross-country flying. Part of this is undoubtedly due to the clean lines of the craft and the fact that the power supply is centrally mounted.

Elevator trim is accomplished with the overhead crank found in other Piper aircraft and it is just as effective in this model as in the others.

Along with Piper pilot Howard Graves, I ran several performance checks at different altitudes and found that my figures coincided with the figures published by the company. The Comanche doesn't seem to be either oversold or undersold.

With the two of us aboard, on a cold day, the Comanche came off the runway consistently in less than the 750 feet claimed. True airspeed at 7,500 feet at 75% of power averaged 158 mph.

The Comanche averages 10 gph fuel consumption at 75% power, which gives an effective range of about 850 miles, with four people and 100 pounds of baggage aboard. Price tag on the standard model is $14,500, with customizing available that includes ADF and Omnigator.



THE MODERN AIR ROUTE TO EAST AFRICA

COMING IN 1958!

DC-6B Service between Athens and Addis Ababa via Cairo

NEW SPEED, COMFORT, LUXURY FOR EAST AFRICA TRAVEL!

• Six International Convair Flights Weekly between Athens and Addis Ababa via Cairo, Khartoum, Asmara and Port Sudan.

• Frequent connections to Aden.

የኢትዮጵያ አየር መንገድ ።

ETHIOPIAN AIRLINES

THE WONDERLAND ROUTE

General Agents in United States and Europe

TWA

TRANS WORLD AIRLINES

Convairs speed up CAA flight inspection program

CIVIL AERONAUTICS ADMINISTRATION'S intermediate-altitude flight inspection program is ready to swing into full operation with delivery of the first five Convair 440s. (See AMERICAN AVIATION, No. 18, p. 75.)

The Convairs will keep tabs on the country's network of navaids and traffic control facilities. CAA is replacing its older, slower aircraft with the C-131E version of the 440 in order to keep up with increased complexity of its facilities. These aircraft cost $825,000 each, can operate efficiently in the testing program at altitudes from 10,000 to 20,000 ft.

Most of the older craft will be retained for use in low-level test programs, while the high-altitude inspection (20,000 feet and over) will be carried out with borrowed USAF B-57s.

Valuable lead time for evaluating the Convair and the electronic test equipment was provided when the Air Force's Air Materiel Command diverted one of its own C-131Es to the Flight Inspection Division of CAA last November.

Since that time aircraft and equipment have been undergoing exhaustive testing under the supervision of project officer J. Chester Shimp.

Now, with a full year's operational experience under their belts, the Convair crews are putting the inspection technique to the acid test by checking out the new Vortac station at Philipsburg, Pa., the first of 1,200 such stations planned. First results indicate that the system is accurate within 491 feet in computing an aircraft's air position at an altitude of 20,000 feet.

Shimp considers the degree of accuracy possible with this system "phenomenal."

He points out that the old system employed by the inspection division supplied only "approximate" information compared with the present technique. In evolving the technique, various combinations of radar and bombsight methods were explored, but were rejected in favor of pure electronics.

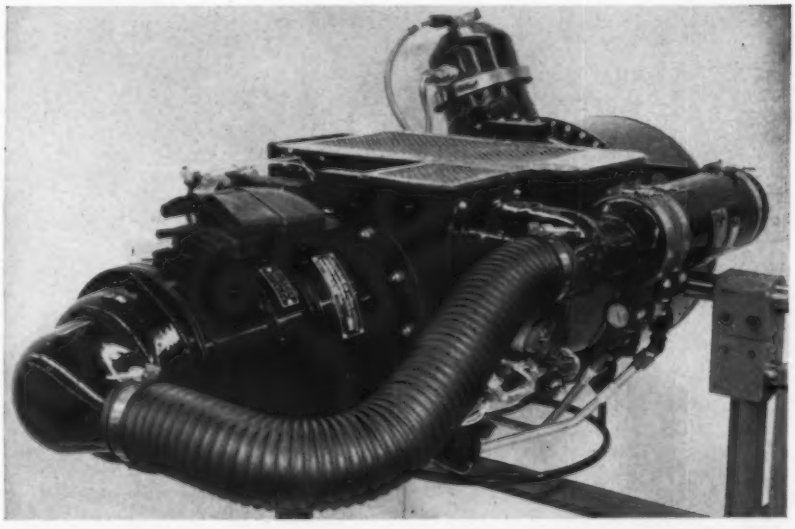
The operating console used by the test crew is located in the spacious cabin of the aircraft, complete with its own gas-turbine-powered auxiliary power unit.

The sole purpose of the console, with its $70,000 package of electronic gear, is to fix the position of the aircraft in the air and to furnish simultaneously a record of the bearing from the plane to the ground stations.

AiResearch Mfg. Co. engineered a gas-turbine unit that would make the console self-contained and would also furnish power for engine starting. Engineering costs amounted to $25,000. The unit price of the installation is $20,000.

Mounted in the console is a pair of direct-reading civil DME and DMET (distance-measuring portion of Tacan) receivers, which are connected to a pair of Hewlett-Packard electronic counters. The DME instruments furnish information computed at the ground station and transmitted to the airborne receiver, while the H-P counters compute the distance to the ground station in microseconds.

OPERATIONS OFFICER of CAA's intermediate-altitude flight-check program, J. Chester Shimp, sits at console of Convair used in the program. Hewlett-Packard electronic counters can be seen at left, while the Esterline-Angus direct-bearing recorders are at lower right. Along with an IBM #650 computer, the above equipment furnishes information in seconds that previously required from 40 to 50 hours.



MODEL GTP 70 gas turbine power unit developed by AiResearch Mfg. Co. Unit was engineered by AiResearch's Phoenix (Ariz.) plant in a pressurized version for the Convair fleet, enclosed in a "capsule" vented to outside pressure. Output is 40 kva, effective from sea level to 25,000 feet.

Two Esterline-Angus direct-bearing recorders mounted in the console furnish a continuous record of the bearing from the aircraft to the ground station as the distance measurements are being recorded, while a 36-channel recorder at the extreme right end of the panel records all information furnished by the battery of instruments.

In an actual test run, such as the

Star track photograph created by time exposure of film while camera was focused on Polaris.

WHAT IS SPACE?

Some 500 miles above the earth, a few solitary molecules of atmosphere are the final "land's end" of our small island in space—the outer reef beyond which lies an immense cosmic ocean so inconceivable that men had to invent a symbol (∞) to denote it.

How vast is this ocean, and what lies beyond our shores?

First, our own sea of stars: This is a giant wheel-shaped galaxy containing some 300 billion stars. Imagine a speck the size of a dust particle on the spoke of a cosmic carriage wheel 1,000 miles in diameter. This is the relative size of our sun, one small life-giving star in the great procession. And beyond our galaxy, at least 100 million more such galactic systems are telescopically visible. The "weather" of this cosmic ocean is composed of strange storms of cosmic radiation, distant clouds of interstellar gas, violent geomagnetic tides and currents, sudden showers of meteoric dust.

It is this weather that we first seek to understand. Much needs to be learned about cosmic rays, the nature of gravity, the physics of light, the true chemistry of "nothingness," the temperature of space, and the movements of the atmosphere on our small island below.

Our first few hundred miles voyage into space will be an infinitessimal step into the 600 billion billion miles of the visible eternity surrounding us.

MARTIN

BALTIMORE · DENVER · ORLANDO

one conducted at Philipsburg, the plane's bearing to, and distance from, two separate stations are recorded simultaneously. One of these is the station being tested and the other can be any station in the area, though it must be close enough for the airborne equipment to receive a strong signal. The angular distance in microseconds and nautical miles to each station is recorded at 10-degree intervals as the plane navigates a complete circle around the station being tested. As each 10-degree "freeze" is made, the bearing to the stations is also recorded. This, in effect, is twofold triangulation.

All of the data accumulated is fed into an IBM #650 computer when the mission is completed and the exact "air fix" is computed within seconds. The U.S. Coast and Geodetic Survey uses the information to fix the exact position of the aircraft over the ground so that the magnetic bearings and distances can be worked out on charts. This final information can be compared with the signals transmitted by the ground stations to determine their degree of accuracy.

At present, the computers are in the CAA offices at Washington National Airport, but after all five aircraft are in use they probably will be equipped with computers so that data can be analyzed in the course of the test mission.

As presently organized, the Flight Inspection Division will have 30 assorted aircraft engaged in flight-test at low altitudes, five Convairs in the intermediate-altitude program and two B-57s handling the high-altitude inspection. The planes will fly a continuous grid-pattern across the country, monitoring the 3,000 modern facilities planned for the nation's airways by 1962.

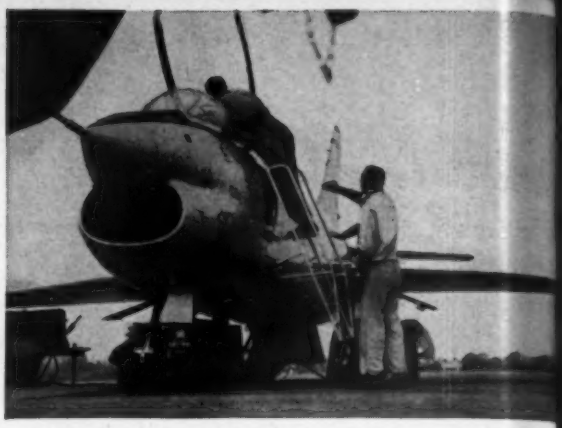
AIA elects Bunker chairman for 1958

George Bunker, chairman and president of The Martin Co., has been elected chairman of the Aircraft Industries Assn. for 1958. C. J. McCarthy, chairman of Chance Vought Aircraft, Inc., was named vice president.

Re-elected to present positions were Orval Cook, president; DeWitt Ramsey, vice chairman; Leland R. Webb, western regional manager; and Harrison Brand, Jr., secretary-treasurer.

Membership of AIA's board of governors was expanded to 29. New members are Dan Kimball, president of Aerojet-General Corp.; John P. Gaty, vice president and general manager of Beech Aircraft Corp. A. W. Laird, New York Air Brake Co.; A. L. Malcarney, executive vice president Defense Electronics Products Div., Radio Corp. of America; Don R. Berlin, chairman and president of Vertol Aircraft Corp. W. T. Piper, Sr., president of Piper Aircraft Corp., is an ex-officio member by virtue of his position as chairman of AIA's Utility Airplane Council.

Bristol Olympus—world's most powerful type-tested turbojet. The Olympus, through its Bristol-pioneered "twin-spool" system, has twice captured the world's altitude record for turbojets. It has been type tested at 16,000-lb. thrust—more powerful than any other type-tested jet. Olympus engines power the RAF's Vulcan atom-bombers.

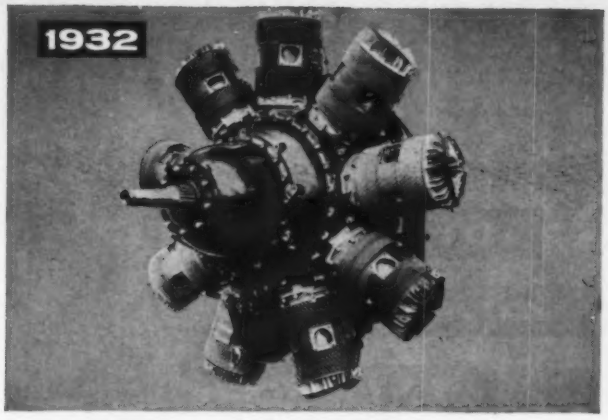


Lightweight leader—the Bristol Orpheus is an outstanding lig weight power plant, in world-wide demand for fighters, strike craft, executive transports, and trainers. Already the Orpheus h been chosen to power 12 different aircraft being built in 8 countri Shown here is the Orpheus-powered Fiat G91 lightweight str aircraft—for NATO.

POWER IN

The Proteus free-turbine turboprop is in world-wide operation in the Bristol Britannia. Flexible, quiet, reliable—the 4,120-horsepower Proteus is the most powerful and economical turboprop engine in airline service. And in less than eight months its overhaul life has been extended from 500 to 1,050 hours!

Bristol Thor-type ramjets power Bristol Bloodhound guided missiles, recently adopted as the mainstay of Britain's air defense. The Thor is a fully developed power plant, producing great power at high Mach numbers in the upper air, and is also suitable for mixed-power aircraft and test vehicles.



The Bristol Perseus of 1932 started the famous line of Bristol sleeve-valve radial engines. Over 70,000 Hercules and Centaurus engines—latest of this classic breed—have been built, both types being notable for their lengthy overhaul lives and operational reliability.

AVIATION

Versatile Bristol engines speed world-wide aviation progress

The brilliant Bristol Britannia is only a part of the Bristol story. Another part is to be found in the design offices, laboratories and production shops of Bristol Aero-Engines Limited. Here, for nearly forty years, Bristol designers have been producing power for the wings of the world. Power for defense. Power for civil air transport.

From piston engines to the most advanced ramjet guided missile power unit, Bristol engines have consistently pioneered new design principles—demonstrated their unparalleled reliability.

World's first supercharged turboprop—the new Bristol Orion has an outstanding power-to-weight ratio in cruising flight combined with a specific consumption better than the leanest existing engines.

BRISTOL
Aero-Engines

THE BRISTOL AEROPLANE CO (U.S.A.) INC
400 PARK AVENUE NY22 NY

BRISTOL AERO-ENGINES LIMITED · ENGLAND

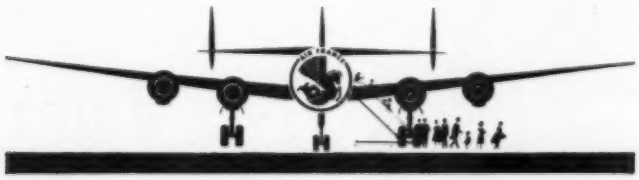
The Men Who Are Air France

No. 10 OF A SERIES

CAPTAIN GEORGES LIBERT

A SENIOR AIR FRANCE CAPTAIN

In every country you find men like this—men whose natural home is the sky. Captain Libert has been a pilot for over 22 years, totaling nearly 15,000 hours of flight. His peacetime and wartime record is truly impressive, as attested to by the numerous decorations bestowed on him by France and other countries. His record is typical of the men who man the planes of Air France, the airline that has been serving the peoples of 73 countries for over thirty-eight years.



AIR FRANCE

THE WORLD'S LARGEST AIRLINE

38 YEARS IN AIR TRANSPORTATION—A DISTINGUISHED RECORD FOR DEPENDABILITY

SEE YOUR TRAVEL AGENT OR AIR FRANCE • New York • Atlanta • Boston • Buffalo • Chicago • Cleveland • Dallas • Detroit Hartford • Los Angeles • Miami • Milwaukee • Philadelphia • Pittsburgh • St. Louis • San Francisco • Washington, D. C. • Mexico City Montreal • Toronto • Vancouver • Havana • Puerto Rico • Fort de France • Pointe a Pitre • Panama • Caracas • Bogota

How ceramics help metals beat heat barrier

by William Beller

CERAMIC COATINGS that can provide heat-resistance to all metals from magnesium to super alloys have been developed by Gulton Industries, Inc., Metuchen, N. J., says Dr. Paul A. Huppert, director of the company's ceramic coating department.

Such coatings can be used to (1) increase the life of jet-engine combustor chambers and exhaust nozzles, (2) protect aerodynamic surfaces in the thermal thicket, and (3) help solve the re-entry problem of missiles.

To show the severity of the heat problem for aerodynamic surfaces, North American Aviation materials engineer, Dr. James Castelfranco, gives this example:

Suppose we have a vehicle flying at Mach 4 at 100,000 feet and wish to keep the structure's temperature below 500°F. Then for the idealized case of a flat plate set at 0° angle of attack, the heat input one foot from the plate's leading edge is about 3,600 BTU/sq. ft./hr. For an actual craft where the angle of attack is varied, this figure may be increased tenfold.

At the craft's leading edge, the heat transfer rate may be further increased by a factor as high as 100, that is, 300,000 to 400,000 BTU/sq. ft./hr. This contrasts sharply with the case of stationary steam-generating units where the heat absorption rate to the water walls ranges between 25,000 and 80,000 BTU/sq. ft./hr.

Ceramic protection of metals goes back 25 years when the technique was used to insulate exhaust mufflers in diesel engines, particularly for submarine work. During the last world war, the National Bureau of Standards entered the field by devising a ceramic coating to protect low-carbon steel tailpipes of aircraft against heat-corrosion.

Particularly active in the ceramic coating field is Solar Aircraft Co. of San Diego, Calif. Other major companies include Bettinger Enamel Co., Waltham, Mass.; California Metal & Enameling Co., Los Angeles; Linde Air Products Co. Div. of Union Carbide & Carbon Corp., New York, and Norton Co., Worcester, Mass.

After World War II, the market for refractory ceramic coatings fell into a decline. Correspondingly, so did research in the field. This was brought about by two factors:

(1) Materials that had been on the critical list during the war were released. Also, subsequent research led to super alloys which offered high heat-resistant characteristics without need for coatings.

(2) Temperature specifications had advanced to a point where standard ceramic coatings no longer offered adequate protection.

At the same time, these new temperature requirements brought a revival of research in the ceramic coating field. Of high interest today is the coating of super alloys to extend their temperature-resistant range.

Modern requirements call for the following characteristics: (1) chemical resistance at elevated temperatures; (2) heat reflectivity or heat emissivity; (3) surface hardness with improved erosion, abrasion and friction resistance at elevated temperatures; (4) vibration resistance, and (5) heat insulation.

To make a ceramic coating, the manufacturer adds refractory particles to a porcelain enamel, which in turn is a glass fused to a metal. Performance of the ceramic coating thus depends on the characteristics and amount of refractory material used.

There is one major fabrication problem as increasing amounts of refractory materials are added. The application temperature may be high enough to affect the physical properties of the metal being coated. One solution is to use the high fluxing power of lithium compounds. These serve to reduce the curing temperature of the ceramic coatings and thus preserve integrity of the base metal.

Thus, the usual two-phase system of a glass plus a refractory is converted into a three-phase system—a glass plus a refractory plus a fluxing agent.

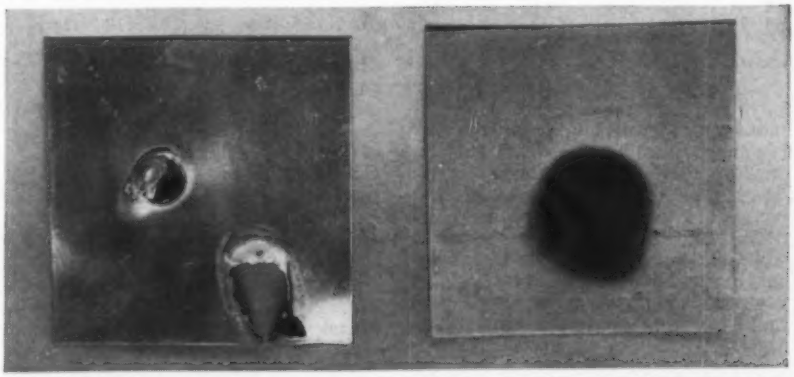
With lithium fluxing agents, two paths are open: (1) for a given amount of refractory material used without a fluxing agent, the curing temperature may be lowered by the addition of a fluxing agent. In this way, the physical characteristics of low-melting-point alloys are preserved. (2) If the base metal can withstand higher curing temperatures, then a fluxing agent permits incorporating an increased amount of refractory material.

Ceramic coatings can be applied to metals by flame-spraying and by furnace-firing. The flame-spraying technique is not too satisfactory, says Huppert, because, essentially, only a mechanical bond is obtained between the coating and metal. On this score, he can expect some argument. He points out that with the flame-spray process only a macro finish is possible, a finish that is quite porous. Because it is a slow process, it is an expensive one, but Huppert concedes that it can be mechanized to reduce cost.

A furnace-fired coating gives a microfinish. The coating is held to the base metal by a chemical bond, which is formed because the oxide of the metal in the ceramic goes into partial solution with the base metal. In effect, an interface layer of metal oxide is formed. Such a layer is said to give the ceramic coating extremely high adherent qualities.

For equilibrium-temperature flight conditions, Gulton says their ceramic coatings can give heat-corrosion protection and, possibly, abrasion resistance for the following metals and temperature ranges: aluminum, 1,200°F to 1,250°F; low carbon steel, 1,400°F to 1,600°F; stainless steels and low alloys, 1,700°F to 1,900°F; super alloys and other specialty items, possibly more than 2,000°F.

For transient flight conditions, such as those met in aircraft or missile re-entry, heat resistance at considerably higher temperatures can be achieved. In addition, survival time of the ceramic plus metal can be measured in



TWENTY-FIVE seconds' exposure to torch flame destroys bare aluminum sheet that can withstand over eight hours' exposure without damage when ceramic coated.

minutes. A still open question is how the structural integrity of the metal would be affected at these higher temperatures.

Normal coating thicknesses range between 0.0005 inch and 0.001 inch. Since a one mil coating thickness weighs less than 10 grams/sq. ft., the increased structural weight is small.

For dynamic flight conditions, a coating thicker than average is needed in order to generate a thermal lag. Thermal insulation can be increased by first flame-spraying the surface to get air bubbles, followed by a furnace-fired ceramic coating. For steady-state flight, a thin coating may be used but with added requirement of high reflectivity.

Where weight and volume factors are critical and call for thin gauge aluminum sheets, a rigid structural system may be obtained by ceramic coating each side of the sheet. This system has the added advantage of increased heat resistance.

To test the life of these coatings, Gulton set up a flame-impingement test in which a torch flame of 2,200°F was directed normal to a plate. Pyrometer measurements showed that surface temperatures on the coating ranged between 1,200°F and 1,300°F. Thermal shock was added to the test by dipping test plate in tap water at intervals.

Under these conditions, coated specimens withstood failure under repeated 8-hour cycles. This contrasted sharply with experience with the bare metal, which was destroyed after 25 to 35 seconds exposure to the flame.

The newly developed ceramic coatings call for three ingredients. First is a standard high-temperature resistant refractory coating. The following have been satisfactory: Bureau of Standards coating A418, Solar Aircraft's coating 5210-2C (Solaramic), and Chicago Vitreous Corp.'s coating SL13-290B. Second ingredient is the super-refractory boron nitride. Third calls for a fluxing agent, preferably a lithium compound.

Recent work has sought to decrease or eliminate the need for "frits," the first ingredient. This can be done by using complex lithium compounds of the glass-like type in combination with boron nitride. In the over 2,000°F range, a temperature drop of 140°F for a coating thickness of 0.001 inch was found on temperature gradient tests.

Application of the coatings does not differ from standard procedure for furnace-cured work. However, the curing temperature can be appreciably reduced with the lithium fluxing agent. Where more than one coating is needed, the base layer serves to promote adhesion and heat-corrosion resistance, while the top coating promotes chemical resistance and improves heat reflectivity and heat emissivity. Where high insulating properties are desired, several layers may be needed.

Preliminary work shows that the furnace-curing temperature of a ceramic coating may cause a loss up to

Characteristics of Gulton coatings for metals in hi-temp use

EXCELLENT = E GOOD = G FAIR = F POOR = P

Coating Number	Base Metal	Adherance	Thermal Corrosion Resistance	Thermal Insulation	Thermal Shock	Impact Resistance	Abrasion Resistance	Dielectric Strength	Thermal Conductivity	Color and Texture	General Purpose
3030E 3040A	Aluminum Magnesium Copper Stainless steel	E G G G	F F F P	P P P P	E E E G	E E E E	P P P F	G F	.. ..	Standard yellow to green; other colors available; glossy	Porcelain enamels overglaze
4063B	Aluminum Magnesium Copper	E G E	G G G	F F F	E F-G G	G-E F-G G-E	P-F P-F P-F	E .. F-G	.. .. ..	White and colors; glossy	Semiheat corrosion-resistance; semichemical resistance
4065	Aluminum Magnesium Copper	E G E	E E E	G G G	E F-G G	G-E F-G G-E	P-F P-F P-F	E .. F-G	.. .. ..	White and colors; matte and glossy	Elevated heat corrosion-resistance; high dielectric
4010C	Stainless steel High alloys Super alloys Molybdenum	E E E E	G+ G+ G+ G+	F F F F	E E E E	G G G G	F F F F	.. ..	F-G F-G F-G F-G	Gray; matte	General heat-corrosion resistance
4061A	Stainless steel High alloys Super alloys Molybdenum	E E E E	G-E G-E G-E G-E	G G G G	E E E E	G G G G	F F F F	.. ..	G G G G	Gray-green; matte	Heat-corrosion resistance; thermal insulation
5006A	Stainless steel High alloys Super alloys	E E E	G G G	F F F	E E E	E E E	P P P	.. .. ..	.. .. ..	Green; matte	Low firing application; med. heat-corrosion resistance
4046	Stainless steel High alloys Super alloys	E E E	G G G	G G G	G G G	G G G	F-G F-G F-G	.. .. ..	.. .. ..	Sandy tan; matte to glossy	Improved surface hardness
6004B	Stainless steel High alloys Super alloys	E E E	G-E G-E G-E	G+ G+ G+	E E G-E	G G G	G G G	.. .. ..	.. .. ..	Gray to black; matte	Improved surface hardness and thermal insulation
6004C	Stainless steel High alloys Super alloys	E E E	G-E G-E G-E	G G G	E E E	G-E G-E G-E	G G G	.. .. ..	.. .. ..	Sandy yellow to brown; matte	same as above
6008	Stainless steel High alloys Super alloys	G-E G-E G-E	G-E G-E G-E	G G G	E E G-E	G G G	G G G	.. .. ..	.. .. ..	Yellow to green; matte to glossy	same as above
6003J	Mild steel	E	E	F	E	E	F	..	..	Black matte	Heat-corrosion resistance

12% of the original tensile strength of the base material. It may be that a modified heat-treating process could decrease or eliminate this loss. One suggestion is to apply the coating simultaneously with heat treatment, or to provide an additional heat treatment after the coating process.

Experience of the Norton Co. with flame-sprayed pure oxide coatings (Al_2O_3) was told at a recent American Rocket Society meeting. The speaker said that such a coated surface will withstand repeated blows of a hammer and the impingement of a welding torch flame until a temperature in excess of 3,600°F is reached. He pointed out that the iron backing-plate that had been used in the experiment had not fused, from which he deduced that a temperature difference of more than 1,000°F, because of the 0.025-inch coating of alumina, had been reached.

In addition to alumina, successful experimental applications of zirconia, zircon, Forsterite, titania and porcelain have been made successfully by the flame-spray process. The coatings were somewhat porous and did not provide complete protection against oxidation. And although their coefficients of expansions were somewhat less than for most metals, the coatings did have a flexible characteristic derived from the mechanical interlacing of particles. This factor could balance the unfavorable coefficients of expansions.

On the high plus side, pure oxide coatings are highly refractory, chemically inert, and are good thermal insulators. They can be applied in thicknesses up to 0.1 inch, are extremely hard and erosion-resistant, and can be applied to a wide range of shapes and to a variety of base metals. The coatings also have a higher melting point than the backing metals.

Gulton claims that they can adjust the coefficients of expansions and the adherence of their coatings because the coatings depend upon a mechanical plus a chemical bond. This, they say, is more intimate than any other type bonding.

Ceramic coatings are generally brittle and have low elasticity and mechanical strength. However, current industry-wide research has already improved these conditions and may soon make them of minor importance.

VOCAB: communications based on voice instead of code

A communications system, called "VOCAB" and described as an "oral readout of digital data," is being given serious thought by Hoffman Laboratories, Inc., a subsidiary of Hoffman Electronics Corp., Los Angeles, Calif.

"It's nothing new—the fundamental philosophy is as old as the hills," says James D. McLean, president of Hoffman Laboratories, "but the thing we are concerned with at the present time . . . is its adaptation to today's requirements for aircraft, ground, point-to-point and shipboard communications.

JAMES D. McLEAN

The concept is based on a premise that most military operations, whether they be on land, sea or air, use stereotyped words and phrases to execute most maneuvers. An effective procedure, it also can be tragically confusing when combined operations between destroyer squadrons, groups of aircraft or land units bring together several terse and efficient but widely divergent command vocabularies. There is seldom time to detail every order in the "tongue" of each service.

To this assumption and the belief that about 70% of words used for direct commands are superfluous, Hoffman added a third ingredient—oral readout.

Vocal communication is one of the most positive means of transmitting a thought from person to person. Hearing is the last sense to go to sleep and will awaken a person faster than anything else. The subconscious screens out unwanted sounds acting as a form of band-pass filter in the head.

Combining these three parts in an effort to improve military communications stirred the imagination as to the possibility of storing stereotyped commands in an electronic memory that could be triggered to deliver vocally the proper order from an airborne or shipboard "black box."

Modern military aircraft fly in a self-created "electrical fog," according to McLean, spewing out fields of interference generated by the aircraft's own generators, alternators, radar, transmitters, receiver oscillators, fire-control system, gun-charging system and its electronic countermeasures system.

"What good does it do to design an ultrasensitive radio receiver to listen to that elusive signal from the ground, if you're in the midst of this electrical fog that blankets it completely?" he says.

"So we're trying to improve the situation by transmitting not audio but code in any one of its forms, because it can be read through this electrical fog with more reliability."

In its present theoretical form the system consists of two components, a CW transmitter and a receiver containing the magnetic memory.

The memory unit contains magnetic tape on which such simple command words and phrases as "turn right," "climb," "descend" and "intercept" are prerecorded in a clear accentless voice. Upon receipt of a keyed ground signal, the proper word or phrase (including digits) would be heard by a pilot, in the case of aircraft, or any other individual or group to whom the information is directed.

Hoffman has no completed hardware as yet, but it has had quite a number of its advanced development people working and "noodling" on the project. Discussions have been held with the military.

Sonotone produces new batteries for jets

Sonotone Corp. is producing sintered-plate, nickel-cadmium batteries for use in Boeing B-47 Stratojets and Lockheed F-104 Starfighters and other high-performance military airplanes. The company also is testing similar electrical power sources for commercial jet airliners.

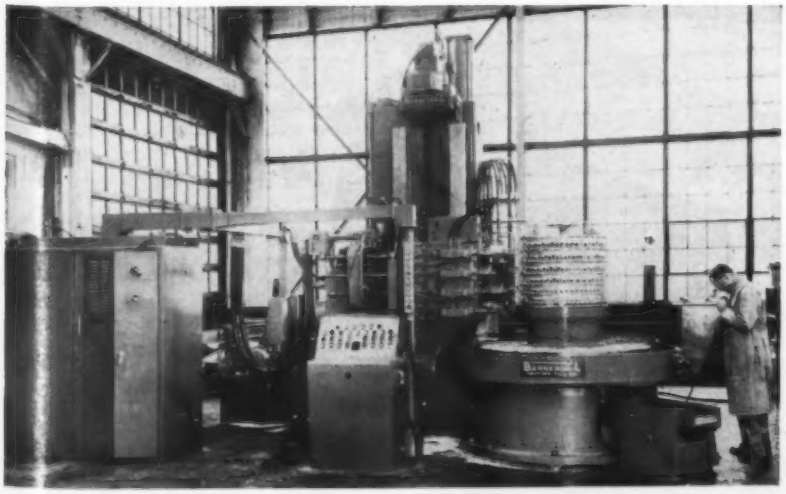
The military work is being done under a $3.4-million initial-production contract. Sonotone officials say the sintered-plate, nickel-cadmium types were chosen following two years of service tests by major commands of the Air Force. These tests proved the ability of the batteries to out-perform others under the same conditions, the officials said. Casings are stainless steel, supplied by Republic Steel Corp.

Reliable starting power, rapid recharging and cold-weather performance are listed as chief advantages of the Sonotone batteries. The cells have operated without trouble in temperatures as low as −65°F and as high as 165°F and have accepted charges under the same conditions.

The unit for the F-104 weighs about 10 lbs., delivers 24 volts, 100 amperes, and is said to be capable of restarting the jet engine several times in the air in event of a flameout. Similar batteries are being used in the Lockheed T-33, North American F-86D, Republic F-84F, Northrop F-89 and Cessna T-37.

The 24-volt battery used in the B-47 generates a current in excess of 1,200 amps. Battery has two sections weighing 80 lbs. each.

Tape-controlled boring machine for jet components



ANOTHER ADVANCE in automation for aircraft engine industry has been made with this punched-paper tape-controlled boring machine developed by Barnes Drill Co. and General Electric Co. For manufacture of J79 and CJ-805 jet engine components, the machine's motions are tape-directed for drilling, spotfacing, boring, reaming, tapping and chamfering operations.

Los Angeles airport features new design concepts

PHASE ONE of Los Angeles International Airport's $46-million, four-phase, two-year construction project is under way following ground breaking ceremonies.

Designed to provide Southern California with the most modern passenger terminal in the world, the new facility will be the result of 18 months of careful planning in cooperation with airlines that will use the field.

Entirely new concepts in airport design have been incorporated to furnish accommodations for an anticipated nine million passengers in 1965 and 13 million by 1970—including provisions for future expansion.

The terminal area alone will cover 265 acres. It consists of a rectangular layout with independently operating airline terminal buildings located on the perimeter. The area within the perimeter of the rectangle is one story below the airfield level. This will furnish a parking area for 5,000 cars. A central restaurant and concession building will be elevated to afford an overall view from the main restaurant.

Probably the most unique feature of the design is the location of the airline terminal units around the rectangle's perimeter. Each of these units consists of a ticketing building for passenger and baggage check-in, plus a short underground passage to a satellite building located at the actual aircraft-loading area.

Six of the combined terminal-satellite buildings are to be constructed in the present plan with provisions for a seventh unit when traffic demands it.

Each of the satellites will be a small terminal in itself, capable of handling ten 150-passenger jet transports at one time. Each will house waiting rooms, a restaurant and cocktail lounge, newsstands and other services.

The design also calls for the separation of ticketing and baggage operations from the public lobby space and passenger services in the satellite buildings.

This concept will avoid the tremendous confusion and congestion so prevalent in present large airport terminals.

Another annoyance to many passengers, the climbing of stairs between terminal levels, has been eliminated in the Los Angeles plan. From the time a passenger leaves his car in the parking lot, passes through the terminal building of the airline on which he is to travel into the satellite terminal where he will board the aircraft, he will remain on one level.

Escalators will carry passengers from the satellite's underground passage to the satellite's lobby level. A service elevator is available for invalids.

Passengers arriving by commercial transportation or in the cars of friends may be taken directly to their airline terminal building on the circling perimeter drive. Baggage will be handled in accordance with the requirements of individual airlines.

The satellites are interconnected by underground passages and the area under each unit will be occupied by offices and operations rooms for the various airlines. International carriers and continental carriers will be located on opposite sides of the central area.

One satellite-ticketing area will house the international carriers together with Immigration, Public Health and Customs officials. Each of the satellite buildings has two floors.

Of the six units planned in the initial program, one will be for international operations, one for local service and regional carriers and the remaining four will house the four air carriers with the greatest amount of traffic.

The center building of the rectangle will house the main concession area of shops and services one level above the parking lot. Passengers or visitors from this area will use walkways over the parking lot to reach the ticketing buildings.

The entrance to the central building area will be marked by a 150-foot control tower, housing all the CAA offices and personnel, plus the most modern radar, radio and navigation equipment available.

From an operations standpoint, the new concept calls for an extension of the present runway system to 10,000 ft. and construction of an additional east-west runway with an initial 8,925 ft. and provisions for extension.

Phase One includes the new east-west runway; relocation of the Dept. of Airports maintenance yard; development of a maintenance area for joint use by the smaller air carriers, and internal service roads. Completion time for this phase is 12 months at an estimated cost of $2 million.

Phase Two, with an estimated cost of $5,536,508, is scheduled to be contracted by May 1958 with a completion time of 12 months. This phase will include grading of north and south aircraft aprons; excavation of the rectangle's central area; construction of underground passenger and baggage channels; underground utilities, water and sewage systems; drainage; reinforced concrete retaining walls and lengthening of the existing north-south runway to 6,754 feet.

Phase Three, with an estimated cost of $21,879,585, is scheduled to be contracted by Sept. 1958. This phase includes construction of the six ticketing and satellite buildings by Jan. 1, 1960; central area buildings by Dec. 1959; control tower by Sept. 1959.

Phase Four, with an estimated cost of $7,266,281, is scheduled to be contracted by Feb. 1959 with a completion date of Dec. 1969. This phase includes the paving of aircraft aprons, paving of parking areas and internal roads, and lighting for aircraft aprons and streets.

The new plan was designed by a joint venture of architects and engineers, William Pereira, Charles Luckman, Welton Becket and Paul R. Williams. Economic and financial consultant was K. A. Osterberg, Aviation Services Co., Minneapolis, Minn.

The overall program is under the supervision of the Board of Airport Commissioners and its president, Don Belding.

AERIAL VIEW of Los Angeles' new $46-million "dream" airport.

$99
PLUS TAX

LOWEST FARE NONSTOP NEW YORK–LOS ANGELES ON THE DC·7

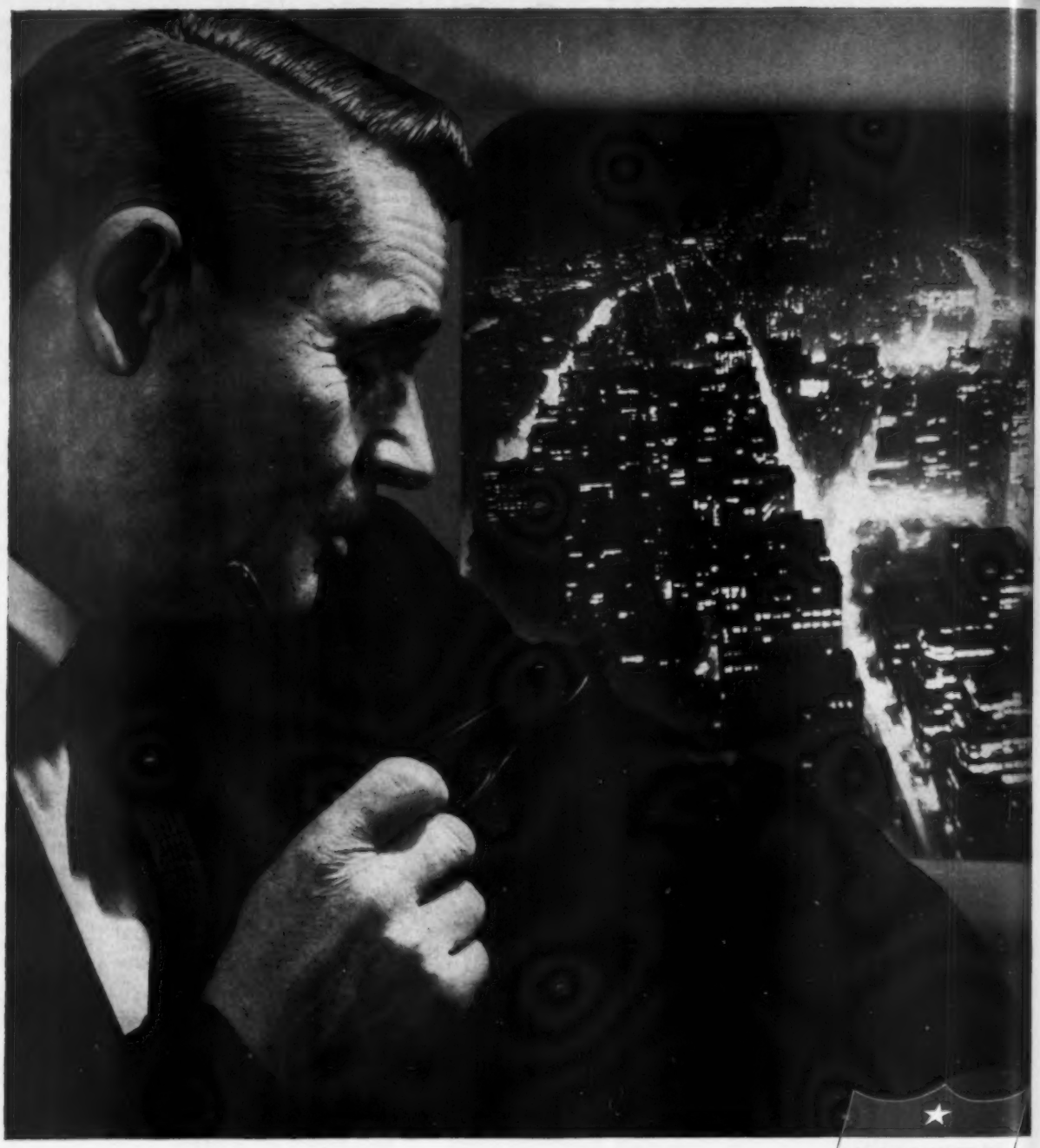
AMERICA'S FASTEST AIRLINER

Only on American's famous Royal Coachman can you fly nonstop on the DC•7 between New York and Los Angeles for $99! The DC•7 is America's fastest airliner and the Royal Coachman, America's first and foremost luxury aircoach service. There's a choice of convenient daily flights and you're welcome to use American's "Go Now –Pay Later" Plan.

New York to Los Angeles
Lv. (EST) 9:30 am, 12:30 am Ar. (PST) 3:15 pm, 6:15 am

Los Angeles to New York
Lv. (PST) 8:30 am, 8:30 pm—only 7 hrs., 15 mins.

AA
AMERICAN AIRLINES
Americas Leading Airline

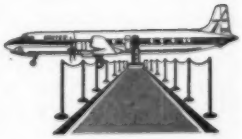


YOUR EASIEST WAY TO "COMMUTE"

UNITED AIR LINES

United is first choice of businessmen who like to fly "over and back the same day." United serves more states than any other airline. It's the only one-airline service linking the East, Midwest, all the Pacific Coast and Hawaii—connecting 80 cities in the nation's greatest industrial areas. When you use United's fast "commuter" service you can spend a full day up to 700 miles away, be back home that night.

Copr. 1957 United Air Lines



CAB Chairman: an old job gets new power

Industry jet commitments, traffic congestion, economic conditions, all add new prestige to Board leadership

by William V. Henzey

A MONUMENTAL SET of problems and events occurring simultaneously has propelled CAB Chairman James R. Durfee into the role of perhaps the most responsible single aviation figure in government today.

DURFEE

Though not necessarily the role intended for a member of the five-man aviation board Congress created 19½ years ago, the development is not out of harmony with the fast and changing pace of aviation today which defies comparison with the circumstances existing when CAB was set up in 1938.

Whether it be the White House or the Congress that wants an answer or whether the question be on such non-economic subjects as airspace control or air safety with all its ramifications, the man most often called upon to answer today is the CAB Chairman.

No longer are the problems of the CAB centered solely on the nation's airlines. Future military aircraft programs will turn largely on decisions made by Durfee and/or the five-man CAB.

The aircraft manufacturing industry is turning to CAB with new interest and such real matters as national defense, national welfare and, in fact, the nation's economic stability, hinge to a great degree on actions and decisions of Durfee and/or the five-man agency he heads.

Long arm of coincidence

Coincidence, as contrasted with any voluntary aims or designs on Durfee's part, is chiefly responsible for this almost-overnight transformation of a man whose public life, until early last year, was confined to the State of Wisconsin.

Durfee is not responsible for the jet age being upon us or the $2-billion-plus commitment for jet aircraft made by the nation's airlines. But he is now responsible for the success of that program.

He is not responsible for the changes taking place in the aircraft manufacturing industry but he now assumes responsibility for that industry's increasing dependence on commercial aircraft orders.

He is not responsible for air traffic congestion but he is now charged with the job of assuring safety until airways modernization becomes a reality.

Nor is Durfee responsible for the fact that aviation is now the nation's No. 1 business, or the fact that the military is depending upon the commercial industry to build up a jet transport fleet in a vital national defense move. But both of these developments now rest largely on his shoulders.

Will affect successors

It should be emphasized that this change in the course of events has propelled not only Durfee to the No. 1 aviation role in the country, but any of his successors in the top CAB spot.

Symbolic of this new situation was a speech given recently by Durfee before the Aero Club of Washington which was correctly labeled a major policy address but didn't even touch on the pressing economic subjects normally associated with CAB policy pronouncements.

For example, the Chairman said: "In many areas—more each year—the air space, like many of our other natural resources, is being exhausted because of the increase in volume and speed of traffic. The multiple users of this resource of air space—military, commercial and private—find themselves more and more in conflict over the proper use of the available space.

"Up to the present, the government has endeavored to resolve these through coordinating machinery. During World War II the Interdepartmental Air Traffic Control Board worked at this. Since 1946, it has been the job of the Air Coordinating Committee. The coordinating machinery, however, has been subject to military veto—a veto power granted to the military by a rule of the Board in 1946.

"After careful study of the prob-

'Pipe organ' noise suppressor on 707

BOEING AIRPLANE CO.'S 707 prototype with multi-tube sound suppressors. Units are results of more than two years of development and are said to reduce noise and change the character of sound. Boeing is working on a thrust reverser for the jets. First production model 707 also has the suppressors installed on its four JT3 engines.

lem . . . the Board recently proposed revision of the air traffic rules to redefine the absolute military veto power within more workable limits—limits which still recognized, however, the primacy of National Defense considerations."

Noting that a controversy with the military has resulted from this CAB action, Durfee promised a solution this way: "If safety for *all* air traffic over the United States is to be assured, the Board can no longer tolerate an unworkable, endlessly time-consuming, veto process" as exercised until now by the military.

Coupled with this illustration of CAB's "new" role was the unprecedented support given the airlines in their plea for a fare hike by the Department of Defense and the Aircraft Industries Association.

The banking world has spoken out before on behalf of the airlines' need for added revenues but never so emphatically as this month when the Investment Bankers Assn. opened its annual convention with the subject of airlines fares and finances.

In short, CAB is the focal point of major national interest matters and Durfee, as spokesman for the Board, is the key figure. He is beset with manpower problems of his own because CAB these days can hardly scratch the surface of its normal business, let alone the major duties added recently.

The President may, as the Investment Bankers Assn. recommended, appoint a personal representative to look into this vast new set of problems. But the President already has the position filled and functioning. It needs only the active interest of the President and the Congress to see that the tools are adequate.

And fewer and less time-consuming Congressional investigations would be a big assist. For while Durfee's duties and problems now range far into the national and international scene, he's busiest trying to comply with extensive requests of the Moulder Subcommittee on Legislative Oversight.

Many new jobs forecast in airline industry

Thousand of new jobs will be available in the U.S. airline industry as a result of the 450 aircraft to be added to the transport fleet by the end of 1960, according to a study by the Department of Labor's Bureau of Labor Statistics.

More than 100 of the new planes will be turboprops and more than 150 will be pure jet, requiring significant personnel increases in several categories, BLS said.

Examples of increases: pilots and copilots, from 14,050 in 1956 to 17,650 in 1960; flight engineers, from 2,600 to 4,350; stewardesses, from 8,800 to 11,550; dispatchers, from 1,400 to 1,760; mechanics, from 34,300 to 54,100.

Senate committee to clear former CAB official, Raymond Sawyer, in 'leak'

The Senate committee which investigated the Aug. 2, 1956 "leak" of CAB's decision in the New York-Florida Case will issue a formal report soon on that investigation, bringing to light for the first time a CAB conclusion that former Board official Raymond Sawyer was not the source of the leaked information.

There are no indications that the Senate group agrees with CAB's findings. But a top-level three-man CAB committee which reviewed the record compiled by the Senate group in its nine-month investigation exonerates Sawyer, who since has left his CAB post.

Sawyer, who was executive director of CAB at the time of the New York-Florida Case blow-up, was referred to as the "only other possible source" of the leaked information by a witness who testified at public hearings conducted last May by the Senate Permanent Investigating Subcommittee.

Sawyer denied the allegation under oath and the record in the Senate Investigation was turned over to CAB for whatever action it deemed necessary. The Board appointed a committee consisting of Member Louis J. Hector, Secretary M. C. Mulligan and Associate Counsel John Wanner.

Recently, the results of the CAB committee's findings were transmitted to the Senate group. When the forthcoming Senate report is issued it will contain CAB's statement concerning its committee's findings.

Basically, they are that Sawyer, on the record of the Senate investigation, did not leak the results of CAB's decision in the New York-Florida Case to Laurence G. Henderson, then an official of Trans American Airlines.

Actually, the results of the CAB probe were transmitted to the five-man Board in late July but have not previously been made public. Sawyer left CAB in October and recently assumed a position in Addis Ababa, Ethiopia, with the International Cooperation Administration.

Last of United's fleet gets airborne radar

UNITED AIR LINES' fleet-wide installation of radar was completed with final adjustments to nose antenna on this DC-7. Now all 186 aircraft flying United routes are radar outfitted. The $5-million program started in 1955. Mechanic Harry Carlson of San Francisco base makes final adjustments.

Why airline earnings are low and unpredictable

by Gerald A. Fitzgerald

ONE OF THE real paradoxes of the age is the fact that the airline business is so attractive to every American because of its dynamic progress and growth qualities yet so unattractive to those with investment funds necessary to insure a continuation of that progress and growth.

Perhaps the best explanation of the reason for that paradox is included in an exhaustive study just made public which shows that in a panoramic view of all American industries, the air transport business will show up in the lowest, and rarest, category from the standpoint of earnings and stability.

The study came to light when American Airlines' W. B. Hickman testified before CAB at the opening of the General Passenger Fare Investigation. Hickman, vice-president for economic research, submitted the study compiled jointly by American and Studley, Shupert and Co., Boston investment consultants, in the first phase of the fares hearings devoted to investigation of the airline rate of return.

The study is based on the idea that the airline differs strikingly from other public utilities in at least three fundamental ways:

(1) Airlines, unlike other utilities, are subjected to intense competition.

(2) Airlines are highly volatile and their profits are more sensitive, unstable and unpredictable than are those of other utilities.

(3) While airlines have been able to convert less of their increased revenues into profits than have other regulated industries, they have nevertheless plowed a larger portion of earnings back into public service than have other regulated industries.

According to the study, the economic character of the airline industry places it actually closer to that of the non-regulated-type industry. The study, working on this basis, compares airlines with various types of unregulated industries.

One-hundred ninety-five business corporations representing 33 different nonregulated industry-groups were selected for the comparison. They include aircraft and automobile manufacturers, textile, food products and chemical industries, and generally as many different types of industries as possible which are roughly similar to airlines as to degree of instability of earnings.

The earnings of such regulated corporations as electric utilities, gas companies, pipelines and telephone companies exhibited so high a degree of earnings stability as to place them in an entirely separate category.

In order to limit the distortion of the earnings relationships worked out by the study, six separate types of earnings rates were compiled:

(1) Net income (before fixed charges and Federal income taxes) divided by average total capitalization (average of book-values of bonds, stock and surplus at the beginning and end of the year).

(2) Net profits (after Federal income taxes) plus fixed charges divided by average total capitalization.

(3) Net profits plus a variable proportion of fixed charges (the proportion depending upon the maximum Federal income tax rate levied in the year in question) divided by average total capitalization.

(4) Net income divided by average net tangible invested assets (average of net working capital, net plant and other tangible assets at the beginning and end of the year).

(5) Net profits and charges divided by average net tangible invested assets.

(6) Net profits and charges (as defined in 3, above) divided by average net tangible invested assets.

Hickman calls ratios 1 and 4 the most satisfactory from a scientific viewpoint, since the effect of the varying types of corporate structures included in the sample, and the changing level of Federal corporate income taxes over the years is the least noticeable in these two.

The study defines ratios 2 and 5 as types analogous to those used by most regulatory authorities and usually assumed to represent the return "earned" by those who have supplied the permanent stock of capital.

Ratios 3 and 6, according to the study, are compromise measures of earnings. They are independent of the financial structure of the corporations selected for the sample, but still influenced by the changing level of corporate income taxes.

The results of the study were shown in a series of scatter charts similar to the one reproduced here. The charts, one for each set of earnings ratios, showed a marked similarity in that there seemed to be a definite relationship between the rate of return and the stability of earnings.

The pattern in all six of the charts appeared to indicate that where the earnings were stable, the rate of return was relatively modest, but where the earnings tended towards instability, a more than compensating increase in the rate of return followed.

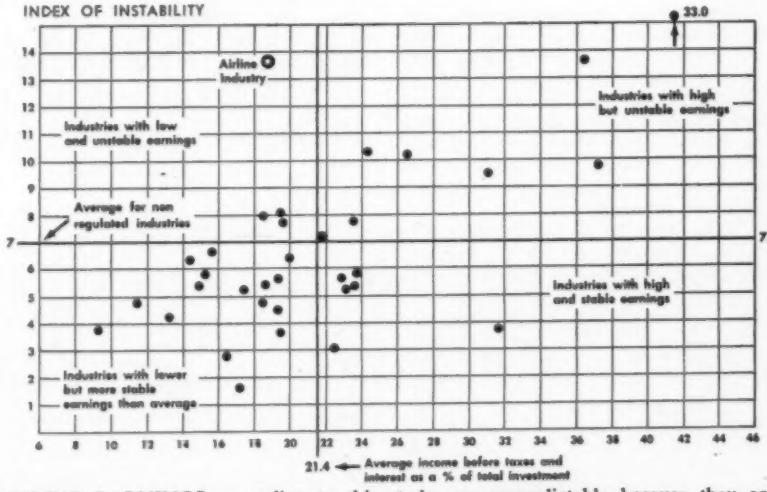
Rarest of all were industries with low *and* unstable earnings. Airlines were by far the most prominent among this group.

The study concluded that the causes for such extreme instability lie in the fact that profit margins are too narrow in a mass, high-volume operation such as the airlines.

Any upward pressure of costs, or any slight hesitation in the rate of growth of earnings, quickly converts earnings rates that might be reasonable in a stable industry into losses that are intolerable in an unstable one.

"Part of the instability," says Hickman, "arises from the fact that while earnings are unstable, we occasionally seem to be operating in a regulatory climate that would be appropriate only for a stable electric utility."

Relationship of earnings to stability, airlines and nonregulated industries, 1933-1955


INDEX OF INSTABILITY
33.0
7.0
Airline
Industry
Industries with high but unstable earnings
Industries with low and unstable earnings
Average for non regulated industries
Industries with high and stable earnings
Industries with lower but more stable earnings than average
21.4 ← Average income before taxes and interest as a % of total investment

AIRLINE EARNINGS, according to this study, are unpredictable because they are too low. Chart shows airline earnings, compared to 33 non-regulated industries, are not only low but also among the two or three most unstable.

South American airlines' cut-rating hits U.S. carriers

by Anthony Vandyk

SANTIAGO, CHILE—The extraordinary situation under which cut-price non-IATA carriers are winning traffic from the established IATA carriers may have dire consequences for the U.S. taxpayer.

If the present trend continues, Panagra's traffic may drop to such an extent it will be forced to appeal to the CAB to go back on subsidy. Braniff International Airways, too, may have to have its subsidy increased as a result of the fierce competition from these small carriers.

Both the U.S. State Department and CAB seem to be unaware of the large amount of traffic non-IATA airlines are taking away from U.S. flag carriers between the U.S. and the west coast of South America.

After an on-the-spot investigation of the situation in Peru and Chile, this writer fully confirmed the state of affairs reported in AMERICAN AVIATION Aug. 12, and which at the time was labeled "fantastic."

Competition from these cut-price carriers is increasing continuously. At present they operate eight flights weekly from Santiago to Miami, New York or Havana. From Lima there are eight flights weekly to Miami.

How big a saving do these "discount houses of the air" offer to travelers? Plenty. For example, the latest attractive fare to be offered is a $446.30 rate for a trip around South America. For this sum the passenger can travel from Miami to Santiago, across the Andes to Buenos Aires and then back to Miami via the west coast of South America.

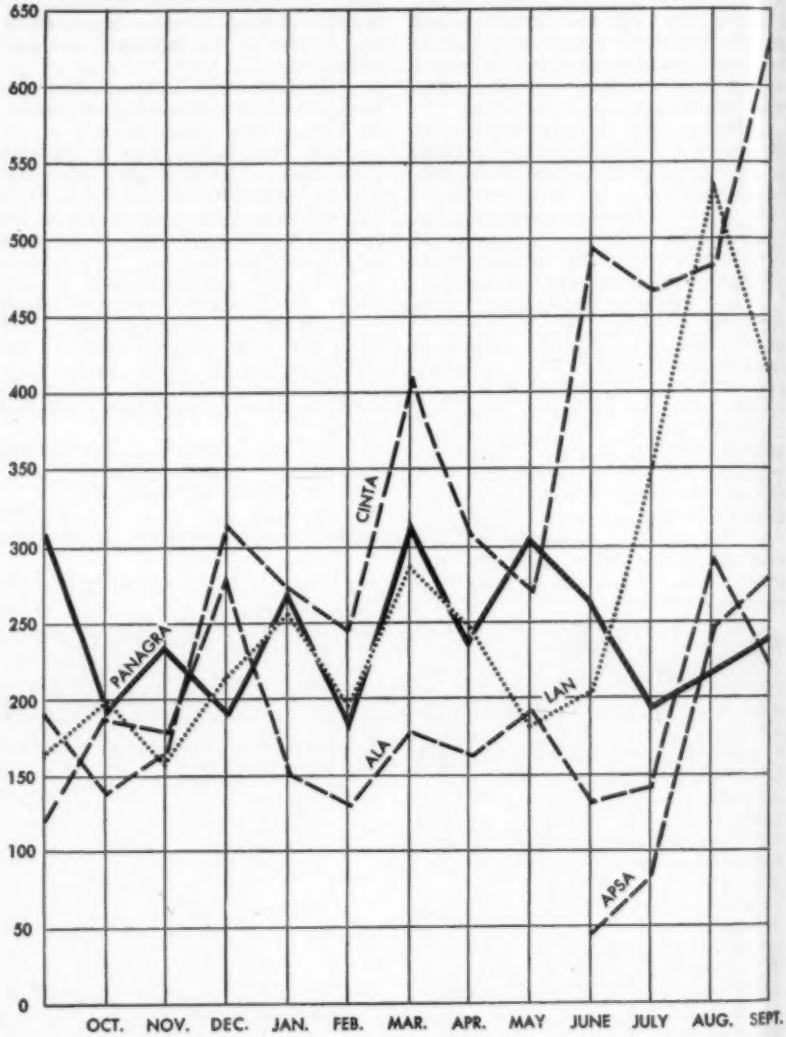
The $446.30 fare compares with IATA Miami-Buenos Aires one-way first class fare of $510 and the roundtrip fare of $779 in tourist class. In fact for $446.30 you can't even get a roundtrip ticket from Miami to Lima tourist class on an IATA carrier (that fare is $473.40).

Other fares offered by the non-IATA carriers offer equal savings. For example ALA, the Chilean airline, advertises a New York-Santiago one-way fare of $269.50 which compares with the IATA first class fare of $542 and the tourist fare of $412.

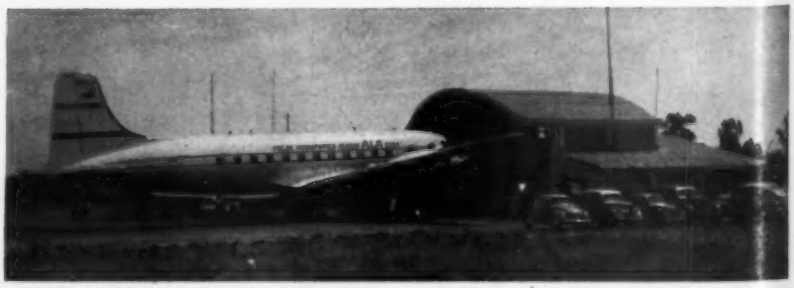
Another Chilean airline, CINTA, has a $230 Miami-Santiago fare which contrasts with the IATA tourist fare of $368. This carrier also has a family fare plan, offering further savings. Between Lima and Guayaquil APA has a $75 30-day excursion fare which is exactly the same as the one-way IATA tourist fare; the IATA roundtrip tourist fare is $135. Under-the-counter discounts often reduce the discounters' fares even more.

Who are these cut-price carriers? There are six now operating on the west coast of South America. Three of

How South American airline traffic has been increasing



INCREASING TRAFFIC being carried by cut-rate carriers on west coast of South America is shown in this chart which covers all northbound passenger movements from Santiago, Chile, between Sept. 1956 and Oct. 1957. Panagra and LAN, Chile's government-owned airline, are the only two IATA carriers.



ALA'S OVERHAUL BASE at Santiago, Chile, is modest. Newly delivered DC-4 looks like a DC-6 because of paint job which disguises shape of windows. CINTA uses similar scheme on its "Super DC-4B's" which are painted in colors similar to those used by Panagra.

South American West Coast Cut-Price Operators

Airline	TAN	APSA	CEA	APA	ALA	CINTA
Country	Honduras	Peru	Ecuador	Panama	Chile	Chile
Aircraft	C-46	C-46	C-46	C-46	L-49	DC-4
No. of seats	36	36	36	40	54	55
No. of flight attendants	2	2	2	3	3	2
Free hot food	yes	yes	yes	yes	yes	yes
Free cocktails	no	no	no	*	yes	yes
Free wine	no	no	no	yes	yes	yes
Free champagne	no	no	no	yes	yes	yes
Free liqueurs	no	no	no	yes	yes	yes
Baggage allowance	66 lbs.	66 lbs.	66 lbs.	66 lbs.	66 lbs.	55 lbs.
Flight crew nationality	U.S.	U.S.	*	U.S.	Chilean	Chilean
On-time performance	very good	fair	*	fair	fair	good
Publicity	excellent	fair	*	good	good	excellent

* No data available.

them operate in close cooperation—TAN (registered in Honduras), Compania Equatoriana de Aviacion (registered in Ecuador) and Aerolineas Peruanas S.A. (registered in Peru).

Observers close to the scene believe that TAN is the guiding force and that this carrier makes available aircraft and pilots to the other two. C. N. Shelton, a vice president of TAN, is said to be responsible for much of the success of the operations of the three carriers. CEA and APSA use TAN's facilities and reservations system in the U.S. The three carriers operate C-46 equipment exclusively.

The cut-price airline operating the most modern equipment from the west coast of South America north is ALA, a well-heeled company which actually is a division of Compania Salitrera de Tarapaca y Antofagasta, a huge nitrate company. This carrier now owns the L-49 Constellation which it previously leased from Cubana to fly up the west coast from Santiago to Havana. While this aircraft was being overhauled Cubana leased a Super-G Constellation to ALA. APA also uses C-46s to fly to Panama which connect with APA flights to Miami. It recently took delivery of some DC-4 equipment.

Perhaps the best-known of the cut-price carriers is CINTA, which has the financial backing of Compania Sud Americana de Vapores Chiles, a major steamship company. This carrier uses DC-4 equipment painted in the same colors as the aircraft of Panagra. It names its flights to the U.S. Latin Americano which is very much like the name long used by Panagra for its first class services—Inter Americano.

The sixth cut-price carrier is Aerovias Panama Airways (APA) which operates twice weekly between Miami and Lima. Its schedules are also coordinated with those of Rutas Aereas SAM, a Colombian affiliate of KLM, to provide service at cut rates to Medellin and Bogota. APA operates C-46s on its flights down the west coast.

The $446.30 round-South America fare offered by TAN, CEA and APSA involve the use of the Brazilian cut-price airline REAL from Buenos Aires to Miami. This carrier has operated DC-4s for many years at lower-than-IATA fares. Currently it flies four times weekly between Argentina, Brazil and the U.S. (three flights terminate in Miami while the fourth continues to Chicago).

Soon, however, REAL will introduce Super-H Constellations on this service and at the same time will increase its fares to IATA tourist levels.

How can U.S. carriers protect themselves against the increasing traffic from non-IATA airlines on the west coast of South America? Undoubtedly, if they so desire, they could beat the cut-price airlines at their own game. This might involve using DC-4s or DC-6s operating a frequent service at prices competitive to those charged by the non-IATA group. But this, the U.S. carriers feel, might divert traffic from the present services.

Another method would be for protests to be made to State Department and CAB. This, however, might invite retaliatory action.

The problem is worrying two U.S. carriers. The cut-price carriers are actually developing a market of traffic for there is no question that many of the travelers who use their services would not fly at all if they had to use IATA carriers at their present fares. They just could not afford it.

To the carriers who have opened up South America to commercial aviation, built airports, installed navigational facilities and educated the local people to regard the aircraft as a transport vehicle rather than an object of fear, the situation is frustrating. But every day it continues and more passengers flock from the U.S. carriers to the cut-price airlines.

Chances are that, in the end, it will be the U.S. taxpayer who pays.

IATA agrees on new North Atlantic fares

The IATA North Atlantic Fare Conference in Paris late last month agreed to fare structures to become effective on April 1, 1958. There will be three classes—first, tourist and economy. First-class fare will be $435 New York-London (against the present $400). Tourist-class fare will be increased from the present $290 to $315.

Most important achievement of the Paris conference was the establishment of conditions for an economy-class at a fare of $252, exactly 20% less than the tourist fare. This class will involve a 34-inch seat pitch. The only food service that will be provided for thrift passengers will be sandwiches and non-alcoholic beverages.

American Airlines' stewardesses train here

Classes are now in session at American Airlines' new $1.3 million stewardess college, located between Dallas and Ft. Worth. The college, shown here, is equipped to train up to 1,000 stewardesses a year.

AA estimates that in 1958 it will interview more than 15,000 girls to get 600 candidates. Recruiting and training costs about $500 for each girl.

Average stewardess has had two years of college, is 24 years old, 5 ft. 4½ in. tall and weighs 113 lbs. (Original AA stewardesses averaged only 5 ft. 1½ in. and 105 lbs.).

Salary begins at $285 a month, goes to $300 after six months and $315 after the first year, with annual increases to $370.

Average length of service is 26 months—and 85% of the resignations are for marriage.

Finnish airlines are efficient and profitable

by Jean-Marie Riche

DESPITE THE FACT their domestic services are operating at the lowest prices available in Europe, both Finnish airlines are operating at a profit and making a definite contribution to the transportation system of the country.

In 1956, state-controlled Finnair (73% of its capital is supplied by the government) made a profit of 6,337,090 Finmarks, slightly less than $20,000, on gross revenues of 1,837,-000,000 Finmarks.

The same year Kar Air (Karhumäki Airways) is reported to have broken even on its two scheduled domestic routes and to have finished in the black on its international operations—all charter except for the Helsinki-Tampere-Stockholm route.

Finnair's profit came principally from its domestic operations, in which the load factor was 64%. In the international service (connecting Helsinki with Moscow, Stockholm, Copenhagen, Amsterdam, London and Paris) the load factor was only 51.2%.

Volume of traffic can be compared with that of most U.S. local service lines. Of 333,066 passengers flown by Finnair in 1956 (an increase of 22% over 1955), 231,594 were transported in the domestic service. Average distance flown on these routes was only 192 miles. Average distance flown on international routes was 415 miles. Such short trips, of course, place a heavy premium on efficiency.

Finnair, also known as Aero O/Y, was created Nov. 1, 1923. Early that year the Karhumäki brothers, who operate Kar Air, began their activities in aviation. By 1940, Finnair was regularly serving nine Finnish airports. Domestic traffic, completely halted during the war years of 1941-1944, was resumed on a small scale in 1945.

Four years ago, a turning point was reached in Finnish domestic aviation. A fare reduction of 20% was put into effect on domestic routes. In one year, traffic increased by 50%. By 1956, it was two and a half times greater than it was in 1953, the last year before the fare reduction went into effect.

Fifteen points are now regularly served by the domestic Finnish routes. Their importance varies greatly. Helsinki, the heart of a network, has a population of 420,000. Only two other towns with more than 100,000 inhabitants are served (Turku, 117,-000, and Tampere, 115,000). But these centers are relatively close to the capital—45 minutes by air.

DC-3s mainstay of fleet

Except on the Helsinki-Oulu-Jynäskylä-Helsinki route, where Metropolitans are flown, Finnish air traffic relies exclusively on Douglas DC-3s. These aircraft were brought to the 26 seats standard when the 20% fare reduction was enforced, in 1953.

Ten of a fleet of 12 DC-3s operated by Finnair are regularly employed on the domestic network; two of a fleet of three by Kar Air. Only one Metropolitan of a total fleet of six owned by Finnair is used in internal connections, while Kar Air uses its first 440 (another one on order is due for delivery in February) only for charter work in Europe and the Middle East. Kar Air is the only European airline employing the Metropolitan exclusively for this type of work.

It is planned to replace the DC-3 progressively with Metropolitans while the standards of the Finnish airports are being brought to 440 requirements. Now being undertaken under the wise guidance of Koskenkylä, the able and dynamic Director of Civil Aviation of Finland, this work is presently being hampered by the lack of resources of the Finnish government (which, it must be remembered, has had to pay one billion dollars of war reparations to the Soviet Union since 1945).

While making a survey flight of the Helsinki-Oulu-Kemi-Rovaniemi-Ivalo route, longest of the Finnair domestic network, this writer could see work undertaken to improve all these airports. In addition, the Finnish Government intends to create nine more new airports for commercial traffic.

Although the climate of Finland is quite severe, an effort is made to keep the airports open during the bad season and Finnair's winter traffic represents 90% of that of the summer.

The regularity is excellent. Finnair, with an average of 1,950 take-offs per month on its domestic routes, cancels only an average of 15 flights per month because of bad weather conditions and 0.3 flights per month for technical reasons. There are no peaks and valleys to speak of in the traffic and no seasonal reductions are therefore granted.

In 1951, 90% of the passengers traveling on the Finnish domestic network were businessmen. At present, traffic consists of 50% businessmen and 50% tourists and other categories. This writer spotted, on the Lapland line, farmers, government employes, geologists and bushmen going north to search for gold, and, naturally enough, tourists.

It was not easy to make the Finnish public air-minded. A favorable point is that a 100% safety record can be claimed by the operators—an impressive achievement considering the period of time in which it was accomplished.

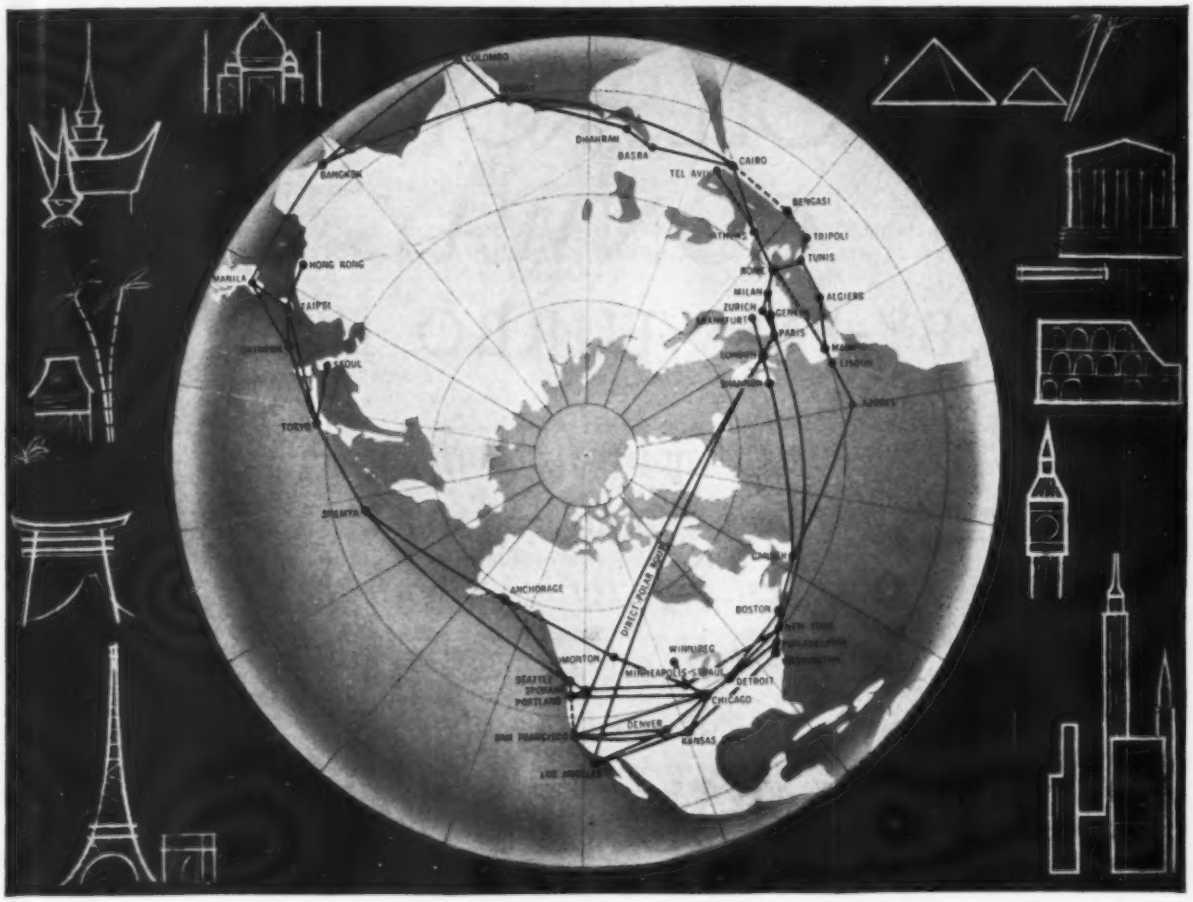
It is noteworthy that, since a policy of cheap fares was developed on the Finnish network, bus companies, many of which provide excellent connections between the airports and the countryside over distances of up to 60 miles, have cooperated closely with the airlines to feed traffic to the airports.

The growth of the Finnish domestic network should continue in the future. Replacement of DC-3s by Metropolitans should accommodate the increase of traffic. Metropolitans themselves will be replaced from 1959 onwards in the international network by three Sud Aviation Caravelles for which Finnair has requested a green light from the Finnish government. Caravelles may also be used on high-density domestic routes such as Helsinki-Oulu.

Altogether, the impression left by the Finnish domestic air service is that its present development is an achievement unique in Western Europe and is worthy of attention and respect from all the specialists in air transport. Only close cooperation between the government services and the airlines has made it possible.

FINNISH POST OFFICE BUS loads and unloads passengers directly from daily plane at Ivalo, Finland's northernmost airport. Bus goes to Utrakoski, 100 miles north of airport, considerably above the Arctic Circle.

There's a new way around the world!



NORTHWEST ORIENT AIRLINES · TRANS WORLD AIRLINES

SHORT . . . FAST . . . "ALL-RADAR" ROUTE

Holiday in Hokkaido? Business in Bombay? Around-the-world tour? Fly the shortest, fastest way! Spend less time in the air and have more time to enjoy your stay with NWA-TWA's new "all-radar" global service!

You travel the direct routes of these two great U. S. airlines . . . on a single ticket! You may start out either eastbound or westbound from any of the 89 cities served by Northwest Orient or Trans World Airlines. Fly TWA through Europe, the Middle East and India or NWA via Alaska and Japan . . . with both airline routes connecting at Manila.

Fly luxurious Northwest Orient DC-7Cs or magnificent TWA Jetstreams* and Super-G Constellations . . . de luxe First Class or thrifty Tourist. Either way, you enjoy complete comfort. Wonderful service! Make reservations early. Call your travel agent or nearest NWA or TWA office today. First flights January 1.

Take a week or a year! Around-the-world Tourist fare as low as $1,365. Budget your trip if you like. Fly first . . . pay later – only 10% down . . . balance in 20 months!

NWA-TWA

NORTHWEST *Orient* AIRLINES
TRANS WORLD AIRLINES

** Jetstream is a service mark owned exclusively by TWA*

THE

ROLLS-ROYCE CONWAY

BY-PASS TURBO JETS

has completed an official British Ministry of Supply type test in accordance with the combined U.S./U.K. test schedule at a rating of

17,250 lb. THRUST

and is in production for the

HANDLEY PAGE VICTOR B. Mk. 2

The British Air Registration Board have already confirmed that a civil version of the same engine has successfully completed a 150 hour test run in accordance with the combined U.S./U.K. Civil Type Test Schedule at a dry take-off rating of 16,500 lb. thrust.

ROLLS-ROYCE AERO ENGINES LEAD THE WORLD

Circle No. 119 on Reader Service Card.

TRANSPORT TRENDS

Airlines are secretly hoping CAB meant a statement it made last August in denying a 6% interim fare increase. Board said it would keep a close eye on industry's financial situation and take action where necessary. Carriers feel their financial position has deteriorated since August to the point where CAB should act now on fare increase proposals and make final adjustments in fare levels when General Fare Investigation is completed in a year or so.

Meanwhile, indications that the White House is getting concerned about the airline situation are seen in quiet inquiries being made by the President's Council of Economic Advisers.

Look for CAB, in a split vote, to uphold basic features of its 1955 decision in the Large Irregular Air Carrier Investigation. Board will probably grant certificates to non-scheduled lines for charter operations and give new exemptions for carriage of ticketed passengers on 10 flights a month between any two points. Major difference in new decision, expected momentarily, will be that individual nonscheduled lines will be granted the awards, in contrast to blanket award to industry in 1955. Some lines, of course, will be denied continued operating rights.

Shakeup in CAA press and public relations staff is well under way, with more changes to come. Raymond Nathan has resigned rather than accept an offer for reassignment to Kansas City. Charles Planck accepted transfer to Alaska. Press activities soon will be taken over by Preble Staver, now Administrator Pyle's assistant for legislative liaison. Publications duties will be transferred to General Services Office in CAA, effective Jan. 12.

Moulder Subcommittee on Legislative Oversight, which has conducted extensive investigation of CAB files since September, has branched out to home offices of various airlines and to the Air Transport Assn. The group, which is investigating all government regulatory agencies, wants all files and records of ATA back to Jan. 1, 1949.

American Airlines is having difficulty getting a Mexican permit for its new Chicago-Mexico City route. All other U.S. and Mexican lines have implemented route awards stemming from March, 1957 bilateral agreement between the nations. U.S. has issued necessary authorization to AA but Mexico hasn't. Mexico appears to be holding out for only one AA flight a day, whereas AA's initial schedule pattern called for a Chicago-Mexico City nonstop to supplement existing Texas-Mexico service.

Decision by British interests on whether they can help Capital Airlines by stretching out Viscount payments isn't expected immediately. Capital officials went to London last month to explain company's serious financial condition. But because a number of interests are involved in the financing—British aircraft and engine manufacturers, government and financial firms—it may be some time before answer is forthcoming.

Grumman Aircraft Engineering Corp. has 19 firm orders for its twin-Dart turboprop executive transport. First plane goes to Sinclair Refining Co., with deliveries starting in 1959. No. 1 aircraft will be off the line about June, 1958. First two will be used for Part 4B certification tests. The turboprop will sell for $700,000, exclusive of radio and navigation equipment.

House investigators are quietly probing the 3¢-mail-by-air experiment. Pushed by House Post Office Committee, Post Office officials late in September put locked tags on air pouches, recorded elapsed time en route. Data will be cranked through PO tabulating machinery and handed to investigators. Government sources hint that both pros and cons were turned up during the three-day trial. Railroad interests are watching the probe closely. This marks the first thorough look at the four-year-old experiment, so watch for a comprehensive report.

INDUSTRY

Bankers agree airlines are jeopardized by outmoded philosophy of regulation

Donald N. McDonnell, chairman of the Aviation Securities Committee of the Investment Bankers Association, has warned that "American aircraft manufacturers have been hamstrung by arbitrary government cutbacks and our airlines jeopardized by an outmoded philosophy of governmental regulation at a time when Soviet aviation advances endanger national security."

McDonnell, speaking at the association's annual convention in Hollywood, Fla., was quoting from an eight-man report to investment bankers who have financed the growth of aviation.

"Under the restrictions of CAB rate regulation," he said, "the airlines lack the earning power and financial strength to serve the public adequately and to finance new jet equipment that will require more capital than at any time in airline history."

The report suggests a three-fold program to bolster the air industry:

(1) *A change in CAB regulatory philosophy*. The report says the "narrow concept of rate of return on depreciated assets should be replaced with a broad philosophy of adequate investment return, including a conservative operating ratio, both of which will certainly require a general passenger fare increase."

(2) *A highly qualified presidential appointee*. This individual would undertake a complete revision of the Civil Aeronautics Act along with CAB procedures. The goal is to present the executive and legislative organs of government with a "concrete program for constructive action."

It was felt that the present "investigatory approach with implications of wrongdoing is not in this instance at all warranted and the IBA committee urged instead a constructive analysis, weighing equally the views of Congressional committees, of the regulatory authority, of the general public, and of industry and financial leaders concerned."

(3) *A meeting between a permanent industry committee and Secretary of Defense McElroy*. Such a meeting, it is believed, would foster "mutually workable solutions to the host of industry problems—problems including delayed renegotiations, procurement fluctuations, program terminations, mandatory subcontracts, and non-reimbursed design changes, among many others."

The bankers termed the present re-equipment programs facing the airlines a "jet revolution." With a note of foreboding, the report stated that "the airlines may be faced with a massive financing of $375 million during a period of declining earnings and general investor disfavor."

The report sees no way of getting around this financial squeeze.

"The alternative is to admit that America, with the world's richest economy, can afford but a second-rate air transport system," the report said.

"The alternative is to deny the airlines the financial strength whereby they alone can fulfill the public service function charged them by Congress."

"The alternative is to reverse the course of progress, forcing the domestic trunklines back from self-supporting independence to a socialized status in which non-user taxpayers must subsidize air transport users."

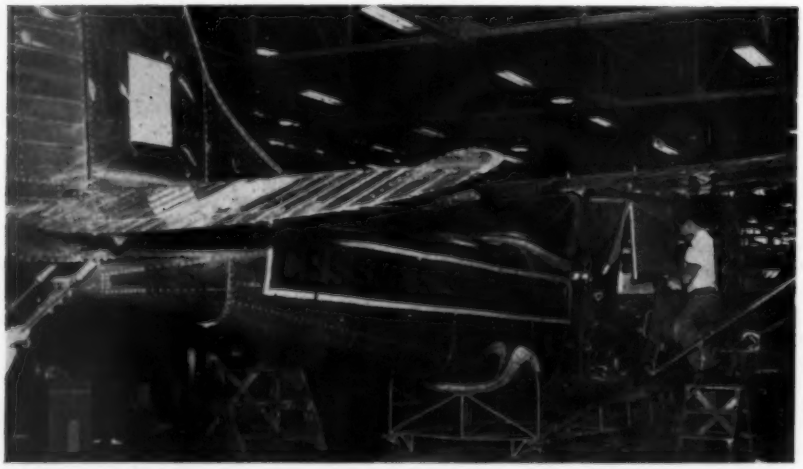
"The alternative is to drive our defense budget higher as the government finances a military jet transport fleet when present plans are to rely on the airlines' jet facilities."

Turning to aircraft manufacturing, the eight-man report characterized this industry as wholly dependent on the level of defense expenditure. This result, as they see it, is an industry subject to governmental limits on profits, but not on expenses or losses. The report singled out aircraft contractors as facing the added hazard of renegotiation and of forced refund of earnings up to four years after completion of contracts.

Judging the manufacturer's problems as largely financial, the report favors a Congressional appropriation and Defense Department policy that "would afford the aircraft manufacturers adequate stability allowing them to successfully compete in the free capital markets for additional investment in their high-risk industry.

"In this sense," the report concludes, "adequacy must be determined not by an arbitrary formula or by an administrative decree but by a growth and stability factor that will attract the required capital to ensure American aviation superiority."

3,000th Bird Dog nears completion



CESSNA AIRCRAFT CO. is working on the 3,000th unit in its series of L-19 Bird Dog liaison aircraft. The plane is slated for foreign delivery under MDAP.

Local Service Viscount to carry 56-61 passengers

U.S. local service airlines are being offered a version of the Vickers Viscount specially tailored to meet the requirements of these operators. Designated the Viscount 790 or Local Service Viscount, the new aircraft basically is similar to the Viscount 745 of Capital Airlines. However, it incorporates many modifications to suit it to local service use.

For example, the Viscount fuselage was designed for normal operation at a pressure differential of 6½ lbs. per sq. in., but for the Local Service Viscount this has been reduced to 4½ lbs., as the operating altitudes will be lower. The wing embodies all the major components of the larger and heavier Viscount 810/840.

Powered by four Rolls-Royce Dart Mark 506 engines, the Viscount 790 will cruise at 320 mph. Maximum takeoff weight is 61,500 lbs. and maximum landing weight 58,500 lbs. Capacity payload is approximately 11,660 lbs., depending on customer requirement and layout.

Passenger capacity can vary from 56 to 61.

IDLEWILD AIRPORT'S new $30-million International Arrival Building looking toward landing area.

First unit of Idlewild's $150-million Terminal City, including half-mile long Arrival Building, opens to public

The Port of New York Authority opened the International Arrival Building at Idlewild Airport for public use on Dec. 6. It was the first unit to be completed in that airport's $150-million Terminal City.

Built at a cost of $30 million, the terminal contains a restaurant, bank, book store, cocktail lounge, florist shop, passenger and visitor lounges and rooms for the use of the press. A 4,000-foot-long observation deck extends along the third-floor level of the building. The tenth floor of the adjacent 150-foot-high control tower is also a public observation deck.

Central unit in the 2,300-foot-long structure, just 300 feet short of half a mile, is the Arrival Building, flanked on either side by the two Airline Wing Buildings. The Wing Buildings house offices, lounges and ticketing facilities for 25 U.S. and foreign-flag airlines, while the main concourse contains the health, customs and immigration inspection services and shopping facilities.

Customs and immigration inspection is accomplished in two customs halls, each of which is equipped with 32 supermarket-type check-out counters that afford rapid clearance and the maximum in passenger convenience. Customs duties are collected at this one-stop clearing position, so when the passenger gets past the counter he is "in."

Enclosed passages lead to 24 aircraft positions and the design of the building will allow for expansion when additional space is needed. Port officials estimate that the Arrival Building will handle 3.3 million passengers a year by 1965, while the total number of passengers using Terminal City—domestic and foreign, is expected to reach 11 million.

Landscaping of the Terminal City includes the International Park, covering all of the area in the center of the cluster of individual terminals. Dominant feature of this park is a fountain, 200 feet in diameter and 60 feet high, located directly in front of the Arrival Building. Surrounding the fountain is a brightly lighted, beautifully landscaped parking lot for 6,000 cars.

When completed Terminal City will have separate terminals for six of the U.S. carriers serving the airport, an operations building, a new terminal for other domestic operations and maintenance facilities.

Air Force to use more data-processing machines

Air Force will expand its use of electronic data-processing machines at each of the Air Materiel Areas, as well as the communication systems between areas and between the AMA's and contractor plants for which each center is responsible. Purpose is to improve both management and the computation of requirements for both inventory and support (see page 27).

A total of $22 million is included in the fiscal 1958 budget, with more to come in later years, the aim being to provide a system for each of the centers. Latest base scheduled to obtain electronic data-processing machines is San Bernardino which is slated to take on the big job of computing requirements, programming and keeping track of the inventory required to support the ballistic missiles.

All machines now included in the program are rented. As of now San Antonio has one IBM 705 computer, with another scheduled for a later date; Oklahoma City, which is responsible for support of all engine programs worldwide, the B-52 program and for Rascal and Green Quail missiles, has two IBM 705s.

Topeka and Memphis, both slated for closing, each have one IBM 705 the fate of which has not yet been decided. Sacramento, Dayton Depot and Headquarters AMC each have Univacs built by Sperry-Rand Corp.

Looking ahead, AMC is planning installation before the end of fiscal 1958 of IBM 705s at Middletown, Pa.; Mobile, Ala., and Ogden, Utah, with Rome AFB (N. Y.) and Warner-Robins (Ga.) scheduled to obtain new Univac machines. No machines are planned for Shelby, Ohio; Gadsen, Ala., and Maywood, Calif. which are slated for closing.

AF officers say that the installations represent a very real effort to improve management of the supply system, which includes about 1.4 million items rather than any attempt to build in automation. As the system takes over punch card requirements are expected to be reduced sharply.

New CAB accounting rule to take effect Jan. 1

CAB's new depreciation accounting rules, first proposed in April 1956, have been put in final form by the Board and will become effective Jan. 1, 1958.

Generally, the new regulation (Amendment No. 2 to Part 241) directs air carriers to use the so-called "straight-line" method of allocating total depreciation charges to annual accounting periods and also prescribes specific depreciation rates for certain classes of aircraft and related flight equipment.

CAB said the principal purpose of its new regulation is "to increase the effectiveness of the Board's prescribed system of accounts and reports by directly controlling the depreciation accounting practices of certificated air carriers."

This would take the place of what CAB now considers to be "indirect control" over depreciation accounting practices.

IATA conferees agree on kerosene-type fuel for jets and need for better fuel-indication systems

Agreement was reached at the International Air Transport Assn. Technical Conference at Miami Beach, Fla. between 10 airlines on a common jet fuel of the kerosene-type which will have a freeze-point of -50°C (-59°F).

The meeting also determined that economical operation will require more accurate and reliable fuel quantity indication systems. Airlines and suppliers agreed that it will be desirable to measure jet fuel input by weight rather than by quantity when fueling the aircraft, a fact that sets up a further requirement for weight-meter fueling facilities.

The fuel discussion also pointed up the desirability of under-wing refueling, rather than the traditional overwing methods, and the requirement for absolute cleanliness of fuel, and thus for improved filtration in fuel supply.

Discussing the final phases of operation, conferees agreed that the economics of jet aircraft are such that they should not be subjected to holding, but should be brought directly into approach.

The meeting gave special consideration to external noise, particularly in the vicinity of airports. After a detailed review of manufacturers' progress in the development of suppressors for their engines and of preferred takeoff techniques, it was the consensus that jet noise levels should be no greater than for present piston-engined aircraft.

As a basis for further development of noise suppressors, it was felt that operators will need more data of the sort that would enable them to evaluate the weight and power loss penalties they may impose. It was therefore recommended that further studies be undertaken immediately through IATA. The airlines individually will be required to decide whether they wish suppressors of the fixed nozzle or retractable type. It was indicated that shorthaul operators preferred the fixed type because of their comparative simplicity, while longhaul carriers leaned toward retractable suppressors which, though heavier, imposed little or no thrust loss in cruising.

Again in their consideration of takeoff, conferees agreed that it would help the pilot of the turbine-engine aircraft to encourage the development of a "go/no-go" instrument or external runway marking device to tell him whether his rate of acceleration is acceptable for the conditions of takeoff, particularly where runway lengths may be a critical operating factor.

Exploring problems of turbine operation under extreme climatic conditions, it was found that, on the basis of data and suggestions supplied by the manufacturers and the Air Forces, neither polar nor tropical conditions present particular difficulties. For takeoff conditions, it was felt that traditional coolants, such as water methanol, although undesirable, may have to be used.

Other instrumentation needs which emerged from the discussions included a requirement for more accurate altimeters to assist adequate separation between aircraft in flight and improved ambient temperature indications.

Strategic Industries Assn. says Defense Dept. 'subsidizes' major producers at expense of independent suppliers

Defense Dept. has been accused by Strategic Industries Assn. of "subsidizing major defense producers with billions of dollars worth of rent-free plants and equipment," thereby "providing means to kill off competition from privately financed independent suppliers."

SIA, formerly Small Defense Industries Assn., estimated that about $10 billion in government facilities are currently being used in the defense industry, with between $6 billion and $7 billion of this in aircraft and missile producing firms.

The 1957 cancellations and cutbacks, aimed at a 5% reduction in defense spending, have resulted in cuts ranging from 20% to 80% for many supplier firms, heavy subcontract cancellations and the use of government-owned facilities to enter direct competition with former suppliers, SIA said.

The association estimated that about 500 firms in Southern California have sold out, gone bankrupt or abandoned defense production because of pullbacks by the big prime contractors. The fault lies with government policy, not with the primes, it added.

SIA presented an eight-point program "to secure maximum production at lowest cost by the free operation of competition without benefit of subsidy to small firms or large." The points:

Issue a Defense directive prohibiting use of government-owned machinery or facilities for subcontract purposes unless privately financed facilities are unavailable to do the work economically.

Prohibit further government-financed facilities for production without a survey to show that private capital is unwilling to provide them.

Study future missile production capacity in terms of modifying existing government-owned airframe capacity in lieu of building more plants.

Adopt a military policy of mothballing production facilities surplus to current needs.

Sell or lease government-owned plants that become surplus to future needs.

Charge rents comparable to cost of private ownership where government-owned facilities are used in performance of subcontracts which cannot be performed in private facilities.

Pay rents on government facilities to the cognizant military services rather than to the general funds of the Treasury.

Amend the Renegotiation Act to provide incentives for cost savings through efficient subcontracting.

Republic to produce French turbine copter

Republic Aviation Corp. has organized a separate helicopter division to handle sales, service and production-under-license of the turbine-powered French Alouette II copter.

Production will be at Republic's Farmingdale, N. Y., plant, with Herbert H. Munsey, former vp of Bell Aircraft Corp., heading up the division. First deliveries are being promised for January.

Five-place copter was designed by Sud Aviation. Powerplant is a Turbomeca Artouste IIB-1 turboshaft engine.

CAB awards Continental shorthaul fare increase

CAB early this month approved fare increases requested by Continental Air Lines for certain shorthaul noncompetitive segments. Board split 3-2, with Chairman James Durfee, Vice Chairman Chan Gurney and Member Louis Hector favoring the increase. Members Harmar Denny and Joseph Minetti dissented.

The fare increase was unrelated to the pending General Passenger Fare Investigation, but the favorable ruling was viewed in authoritative circles as a "break in the dike" in CAB's previously steadfast opposition to fare increases.

Basically, the fare increases, which went into effect Dec. 8, range from 7% to 10% and cover the former Pioneer Air Lines local service routes now operated by CAL, plus certain noncompetitive fares between points on the old Pioneer routes and CAL's trunk system. Fares over CAL's trunk system are unaffected.

Continental gave up subsidy rights to the old PAL routes last April when it activated its Chicago-Denver-Los Angeles route. Purpose of the limited fare increase, according to the airline, is to offset partially an estimated 1958 loss of $1,255,679 over the shorthaul segments involved. The line's over-all system is profitable but its return is "well under the 10% return recently suggested by the CAB staff."

wing muscles for the Lockheed Electra

Soon to be flying the nation's airways is the Lockheed Electra—a medium range, high-speed, prop-jet transport. Wing Flap Actuators for this nimble, fast climbing plane are being manufactured by the Speco Aviation Division of Kelsey-Hayes.

Kelsey-Hayes Company, General Offices: Detroit 32, Michigan

KELSEY-HAYES

Automotive, Aviation and Agricultural Parts • Hand Tools for Industry and Home

17 PLANTS: Detroit and Jackson, Mich.; Los Angeles; McKeesport, Pa.; Springfield, Ohio (Speco Division); Utica, N. Y. (Utica Drop Forge & Tool Division); Davenport, Iowa (Farm Implement and Wheel Division); Philadelphia, Pa. (Heintz Division); Windsor, Ontario, Canada.

hold everything!

Ingenious invention backed by years of research have produced many time-proved proprietary items.
CABUCKLE
HI-SHEAR RIVETS
HI-TORQUE BOLTS
LONG-LOK FASTENERS
SCHWEPPE STUD
LOCKBOLTS
special fasteners for every purpose
There is a V-S Fastener of GUARANTEED STRENGTH to suit your exact need. No matter what the requirement . . . what the configuration . . . what the material . . . your best source for aircraft fasteners is VOI-SHAN
this space reserved
for new products created by Voi-Shan's inventive leadership.
The ultimate in facilities, skill, and experience is your assurance of consistent perfection in every type fastener.
HEX HEAD
FLUSH HEAD
INTERNAL WRENCHING
EXTERNAL WRENCHING
The most complete versatility in types and sizes of special fasteners plus mastery of a multitude of materials is yours at VOI-SHAN.
VOI-SHAN
FASTENERS

VOI-SHAN MANUFACTURING COMPANY • 8463 Higuera Street, Culver City, California
A division of PHEOLL MANUFACTURING COMPANY • Offices in principal cities of the United States and Canada

'Sensible' describes Brazil's handling of air traffic

RIO DE JANEIRO—"Sensible" is the best word to describe the Brazilians' way of handling commercial aviation. Many things that are done in Brazil could well be emulated in other countries. For example, fares. The Brazilians have a fare structure (just revised) so that passengers traveling in modern aircraft pay a higher fare than those using older types.

The structure is very simple—the basic fare applies to DC-7C, Super Constellation, Constellation, DC-4 and Convair equipment. Basic fare is cut 15% for flights in Scandia, DC-3, C-46 and PBY Catalina equipment.

Where aircraft in the basic fare category are used in two-class configurations, the passenger in the tourist compartment pays the basic fare and the basic fare plus 10% is charged for those in the first-class cabin.

Brazilians are also sensible about baggage allowance. Where the fare is less than 1,000 cruzeiros (about $11 at the free rate of exchange), the allowance is 33 lbs. Where the fare is over 1,000 cruzeiros, the allowance goes up to 44 lbs. In other words the Brazilians reckon that for a longer journey you need to carry more baggage.

Ground-handling at airports is also on a very sensible basis. On nearly all domestic trunk routes there is a seat allocation board. Seats are assigned to passengers on all Convair and four-engine equipment flights and also on many schedules with smaller equipment. Even if there is no seat assignment arrangement there is never any pushing and shoving for seats.

The Brazilians use the principle of "first come, first served." As each passenger checks in he receives a numbered plastic disc and passengers board the aircraft in the order they checked in. The agent calls the numbers and the passenger comes forward with his disc.

Rio's close-in airport

The physical location of Rio de Janeiro's city airport is sensible—it is within one minute's *walk* of the center of the downtown area. This field, named after Brazil's pioneer flier, Santos Dumont, was built from reclaimed land in the bay. Recently it has been extended and late last month Panair do Brasil started regular operations with Constellation aircraft from the little field. Previously the biggest aircraft that used it was the Convair. Henceforth Santos Dumont will be used for all domestic flights to the Brazilian capital with Galeao airport remaining the terminal for international services.

The Brazilian government's attitude toward expansion of airports is very sensible. There is a program under way to put paved runways at the most important fields. To determine which are the most important, the government uses commercial passenger movements at the various airports as the basis for ordering improvements.

The Brazilian equivalent of the CAB also has a sensible way of insuring that supply keeps up with demand. Normally a carrier is permitted to increase frequencies if it can show high load-factors (70% to 75%) on a route.

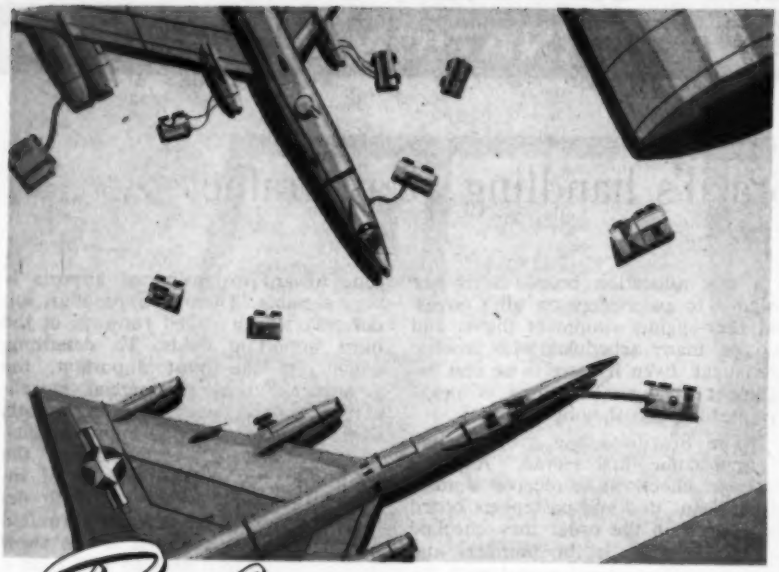
However, if the carrier has load-factors of more than 80% and does not ask to increase its frequencies, another carrier not previously allowed to operate the route is automatically given a permit to compete with the first carrier.

Perhaps the most sensible thing of all in Brazil is the way the government is subsidizing re-equipment programs for the airlines. For a five-year period, retroactive to Jan. 1, 1956, the government is providing an annual subsidy of 450 million cruzeiros. This money is placed in a special fund and can be used only for the purchase of new equipment.

The money is paid on the basis of ton-miles offered and no carrier or consortium of carriers can take more than 150 million cruzeiros.

Argentine executive aircraft cruises at 155 mph

ARGENTINE-BUILT executive aircraft, designated IA-45, is being produced at Cordoba military plant. Powered by two Lycoming engines driven by pusher propellers, its cruise speed is about 155 mph. It is currently undergoing flight tests.



Roylyn GROUND SERVICING EQUIPMENT

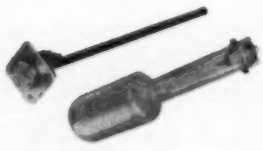
KEEPS 'EM FLYING!

All service points on aircraft, military and commercial, can be serviced easier and faster with Roylyn Ground Servicing Equipment.

FILLER-UNIT ASSEMBLIES . . . Caps, Dipsticks and Strainers. A complete range of types, sizes and designs for oil, gas and water.

AIR-START DUCT and COUPLING . . . Faster Starts with trouble-free operation . . . built for longer life.

LAVATORY SERVICING EQUIPMENT . . . Coupling Valve Designed for convenience and simplicity of operation.



FUEL MEASURING "DRIPSTICK" and "DRIPTAINER" TOOL . . . A new Roylyn design for underwing measurement of fuel . . . tells at a glance, day or night, the level of fuel.

The Best Connections in the World

DESIGNED • MARKETED BY AIRATERRA

620 PAULA AVENUE • GLENDALE 1, CALIFORNIA

Circle No. 106 on Reader Service Card.

HONORS

Richard W. Ryan, exec. vice president of Canadian Pacific Air Lines, has been elected president of Air Industries and Transport Assn. of Canada.

Donald G. Fink, Dir. of Research of the Philco Corp., has been elected president of the Institute of Radio Engineers for 1958.

The Institute of Radio Engineers has announced that the 1958 W. R. G. Baker Award will go to Messrs. R. L. Kyhl and H. F. Webster of General Electric Co.'s Research Laboratory, for their paper entitled "Breakup of Hollow Cylindrical Electron Beams," which appeared in IRE TRANSACTIONS on Electron Devices, Oct. 1956 issue.

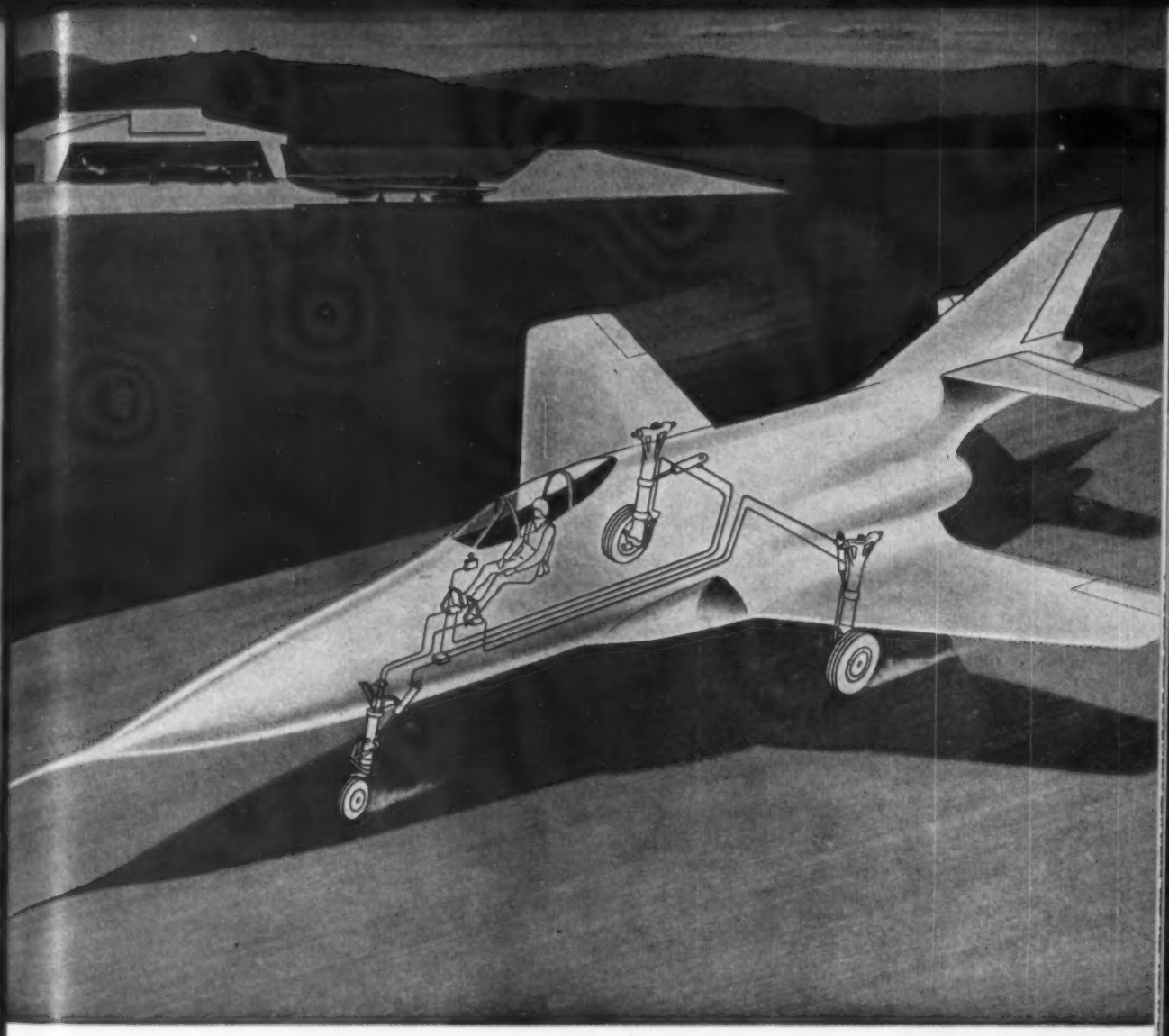
Flight Safety Foundation, Inc., has presented awards to Edward P. Curtis, vice president of Eastman Kodak, and George H. Tryon III, secretary of the aviation committee of the National Fire Protection Assn., for distinguished service in achieving safer utilization of aircraft. Awards of Merit were presented to Max W. Landis and Raymond G. Chase, Civil Aeronautical Administration Air Traffic Controllers, at the same time for their quick thinking and close attention to duty which saved the lives of two men.

Adm. Arthur W. Radford (USN, ret.) has been named to receive the 1957 Forrestal Memorial Award by the National Security Industrial Assn. The award is given annually to "a distinguished American whose leadership has promoted significant understanding between industry and government in the interest of national security."

The following persons have been presented the "Al Merito della Republica" of the Italian Government "as a recognition of their efforts toward an ever-increasing cooperation between the CAA, CAB, and the Registro Aeronautico Italiano: **W. H. Weeks,** Chief of Aircraft Engineering Div., CAA; **Raymond B. Maloy,** Dir., Office of International Cooperation, CAA; **W. E. Koneczny,** Chief of Airworthiness Div., CAB Bureau of Safety; **John M. Chamberlain** (recently retired) Asso. Dir. of CAB Bureau of Safety.

Plush swivel seat

SWIVEL CHAIR designed by Hardman Tool & Engineering Co. for corporate aircraft reclines 70 degrees, can be fitted with pull-out Ottoman leg-rest. Seat comes in wide range of colors and materials.



FROM TOUCHDOWN TO TAKE-OFF

WITH AN INTEGRATED BENDIX LANDING GEAR SYSTEM

When landing, taking off or just taxiing, safety depends upon the unfailing teamwork of everything that makes up the landing gear system.

Retractor actuation, control valves, nose wheel steering, power braking, as well as wheels, brakes and shock-absorbing struts—even tires—these are the things that make up the complete landing gear system. And it is vital that all components function together with split-second accuracy and efficiency.

That is why Bendix* specializes in complete and integrated landing gear systems. For, components that have been designed and engineered to work together give better and more dependable performance than any arbitrarily assembled system. The components of a Bendix landing gear system are engineered as a matched set, then tested and tuned to work together like a trained crew.

So, when it comes to gear for landing, think and plan in terms of a complete landing gear system. Then we suggest you think of Bendix and Bendix Products Division at South Bend, Ind.

*TRADEMARK

Bendix PRODUCTS DIVISION **South Bend,** IND.

Bendix AVIATION CORPORATION

Circle No. 122 on Reader Service Card.

The X-17 is built by Lockheed's MISSILE SYSTEMS DIVISION—now engaged in advanced research-and-development projects involving missiles, rocketry, electronics, nuclear propulsion and outer space investigations.

FOR ALMOST TWO YEARS THE USAF/LOCKHEED X–17 MISSILE HAS BEEN GATHERING DATA ON THE RE–ENTRY OF BALLISTIC MISSILES INTO THE EARTH'S ATMOSPHERE. DURING THESE REPEATED TEST FIRINGS THE X–17 ESTABLISHED THE IMPRESSIVE RELIABILITY RECORD OF HAVING FLOWN SUCCESSFULLY IN 92% OF ALL LAUNCHES.

LOCKHEED *means leadership*

BALLISTIC MISSILE RESEARCH & DEVELOPMENT • ROCKETRY • WEAPON SYSTEMS MANAGEMENT • NUCLEAR-POWERED FLIGHT • ADVANCED ELECTRONICS • ANTI-SUBMARINE PATROL AIRCRAFT • LONG RANGE EARLY-WARNING RADAR CONSTELLATIONS • JET FIGHTERS • JET TRAINERS • COMMERCIAL & MILITARY PROP-JETS • LUXURY LINERS

narco

narco

Sapphire 1016

90 or 360
CHANNEL TRANSMITTER

90 or 560
CHANNEL RECEIVER

CRYSTAL CONTROLLED

MEETS CAA TSO
FOR AIRLINE USE

narco

NATIONAL AERONAUTICAL CORP.
Fort Washington, Pa.

Circle No. 101 on Reader Service Card.

AVIATION FACTS and FIGURES

Official publication of Aircraft Industries Association. Compilation of facts from hundreds of sources in the world of aviation during the past year, of prime importance or interest. 120 pages. Indexed. 6" x 9". Heavy paper bound. Illustrated.

CONTENTS

- Production and Facilities
- Military Aviation
- Guided Missiles
- Research and Development
- Manpower
- Finance
- General Aviation
- Helicopters
- Airlines and Transportation
- U. S. and Foreign Aviation Export
- Public Relations Officials, AIA
- Sources

PRICE $1 PER COPY
AMERICAN AVIATION PUBLICATIONS
1001 Vermont Ave., N.W.,
Washington 5, D. C.

WEST COAST TALK

by Fred S. Hunter

Lockheed hopes military will order early-warning or antisubmarine versions of Electra

LOCKHEED IS HIGHLY HOPEFUL of interesting the Air Force in an early-warning version or an antisubmarine version—or both—of the prop-jet Electra. These are active fields right now, and Lockheed has a background of experience in both with its WV-2 (Navy) and RC-121C (Air Force) AEW Constellations and P2V-7 (Navy) ASW Neptunes.

An Electra military order would be highly beneficial in balancing books on the prop-jet transport. In addition, Lockheed has submitted a proposal to the Air Force for a T56-powered version of its early-warning "parasol" radome Constellation originally developed experimentally for the Navy as the W2V. Terminated by the Navy in the economy wave, testing of the "parasol" plane—once dubbed the flying saucer—has been continued by Lockheed with its own money pending an evaluation by the Air Force.

Lockheed, it might be added, is not without competition in the early-warning aircraft market. Douglas is trying to sell an AEW configuration of its proposed turboprop DC-7 to the Air Force.

Carriers buying Boeing 707s or Douglas DC-8s powered by P&W JT3-C6 engines can be expected to convert to the newly developed, lighter-weight C7s after the latter become available in mid-1959. The weight saving—750 pounds per engine—makes the titanium C7 too attractive to pass up. The C6s can be converted from kits at overhaul periods.

That's yellow, not gold, paint on the tips of the Allison propellers on the Lockheed Electra and it's for practical, not decorative, purposes, we're told. The paint makes the props more easily discernible to ground crews—so they don't brush against them working around the airplanes—and nicks in the props are more easily detected.

An observer at Lindbergh Field in San Diego watching a T-33 take off immediately behind one of Convair's new F-106s was heard to paraphrase one of last season's "bopster" jokes: "Man, I thought he'd never leave." Takeoff of the F-106 is impressively spectacular. The nose comes up almost the moment the afterburner is fired. F-106s being ferried from San Diego to Palmdale are airborne in less than two-thirds the distance required by F-102As.

Three proposed new buildings in the Los Angeles area have on-the-roof heliports under consideration, one 12 stories in downtown Los Angeles, one 20 stories in Downey, one 25 stories in Hollywood.

Boeing, we hear, has installed one of its 502-10 turboprop engines in an L-19 observation aircraft and has completed successful test flights to 20,000 feet. By the time you read this, it may have accomplished 40,000 feet, which is the target altitude for the airframe-engine combination.

Although plans are still tentative, Pan American is scheduling 17 Boeing 707-321s for service with the Pacific-Alaska division, while 21 Douglas DC-8s will go on the Atlantic division . . . This reminds us that when the jets are placed in operation, Pan Am mechanics at San Francisco won't have to worry about work stands being blown into the bay by propeller blasts. Happened again just the other day.

The Lockheed Management Club recently awarded the Cannon Electric Management Club a plaque for sportsmanship on the golf links. No wonder. In this year's tournament between the two the Cannon group didn't win a match.

North American Aviation's salvage store, which disposes of all types of equipment from sewing machines to aircraft and a spool of thread to an oscillograph, is averaging about $100,000 a month in sales now. In the past the average has been as high as $250,000.

Every F-102 now coming out has the Case XX wing, incorporating more camber for high altitude performance.

J. F. McBrearty, assistant general manager for commercial products at Lockheed-Burbank, says the Electra "is in probably the best condition of any first airplane we ever built." There's now even talk of a pre-Christmas takeoff for the turboprop, which would be almost six weeks ahead of schedule.

And now that the politicians have moved in to take charge of the intercontinental missile program, everything, undoubtedly, will be straightened out in jig time, including all those transonic range problems.

Prop-jet Proves AC RELIABILITY

LOCKHEED ELECTRA ILLUSTRATED

LOCKHEED ELECTRA—the all-new four-engine transport scheduled to enter service in 1958—specifies Allison Prop-jet Engines equipped with AC Spark Igniter Plugs.

Lockheed describes the Electra as the "backbone type" of airliner designed to fly the short, regional air routes as well as transcontinental nonstops. Cruising from 75 to 100 m.p.h. faster than the fastest present-day transports, the newest of the Lockheed Line will cut 20 to 30 percent off most existing schedules without sacrificing efficiency!

AC's reputation for reliability is backed by 14 years of experience in the jet ignition field.

ALLISON PROP-JET, rated at 3750 h.p., specifies AC Spark Igniter Plugs for their superior design—the only right-angle spark igniter with exclusive one-piece ceramic insulator—for greater reliability. AC is the only spark igniter plug approved by the C.A.A. for the Lockheed Electra.

flying starts with

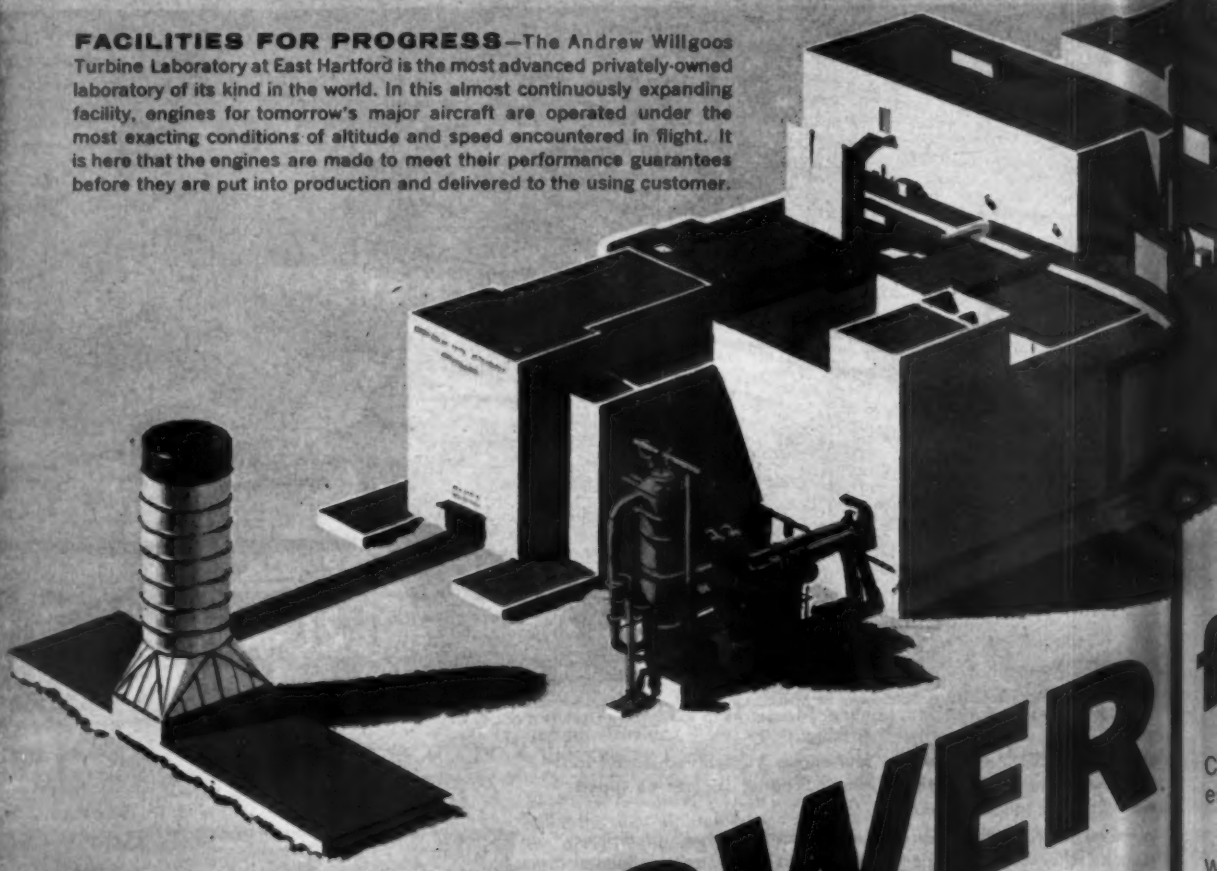
AC SPARK IGNITER PLUGS

Watch Walt Disney Studios' ZORRO every week ABC-TV

AC ⚛ THE ELECTRONICS DIVISION OF GENERAL MOTORS

Circle No. 123 on Reader Service Card.

FACILITIES FOR PROGRESS—The Andrew Willgoos Turbine Laboratory at East Hartford is the most advanced privately-owned laboratory of its kind in the world. In this almost continuously expanding facility, engines for tomorrow's major aircraft are operated under the most exacting conditions of altitude and speed encountered in flight. It is here that the engines are made to meet their performance guarantees before they are put into production and delivered to the using customer.



POWER

for new aircraft...in whatever form it takes

Behind these windowless walls in central Connecticut a new generation of aircraft engines is being put through its paces.

Here in Pratt & Whitney Aircraft's big Willgoos Turbine Laboratory—the most complete privately-owned gas turbine research facility anywhere—tomorrow's engines are "flown" under conditions of simulated altitude, speed and temperature often impossible to attain in actual flight.

These new engine developments present technical challenges in virtually every field of science and engineering. To help meet them Pratt & Whitney Aircraft is continually expanding and modernizing the Willgoos Turbine Laboratory at East Hartford. This advanced research and development facility represents a multimillion-dollar investment by Pratt & Whitney Aircraft to assure continuing progress in the performance and dependability of aircraft engines.

In whatever future form aircraft power may take . . . in a new family of engines, new fuels or materials, or new systems of propulsion, Pratt & Whitney Aircraft will continue its leadership in aircraft engine design and production.

Pratt & Whitney Aircraft

Division of United Aircraft Corporation, East Hartford, Connecticut

CONNECTICUT OPERATIONS—East Hartford

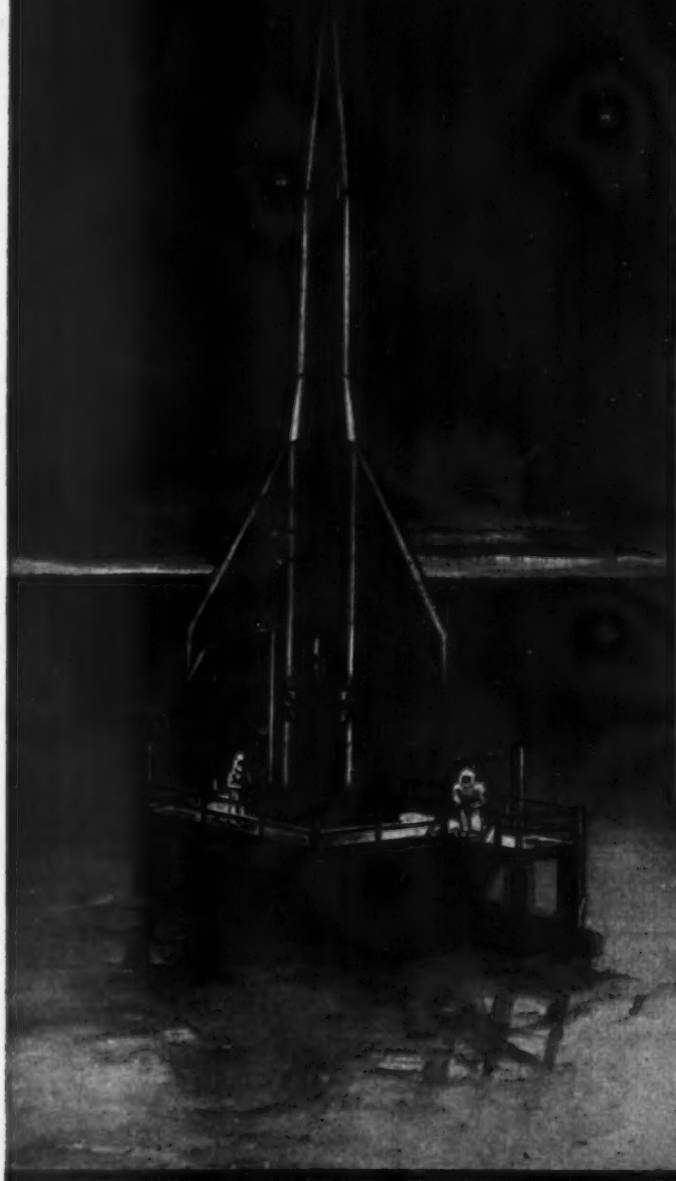
Major branch plants—Meriden, North Haven, Southington

FLORIDA OPERATIONS—West Palm Beach

To Meet the Future's Challenge

ROTODYNAMIC

by STRATOPOWER®



ROTODYNAMIC

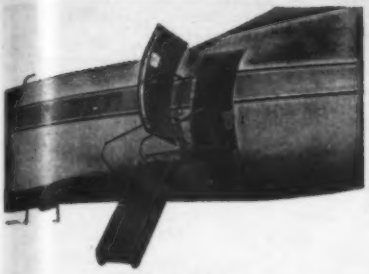
IT'S NEW . . . IT'S TOMORROW

Tomorrow's demands on aircraft hydraulics are for higher reliability at higher temperatures and higher speeds. It's no secret that today's pumps fall short meeting these more exacting demands. ROTODYNAMIC, a newly adapted hydraulic principle, actually improves its standard of performance on these counts.

If your requirements are for high speed hydraulics with a DIRECT DRIVE range between 20,000 and 45,000 rpm, you are talking ROTODYNAMIC. The STRATOPOWER ROTODYNAMIC Hydraulic Pump is designed to operate on all types of fluids (even the lowest viscosity ones) delivering 10 to 25 gpm at 3000 psi.

ROTODYNAMIC is tomorrow's "natural" especially in the field of missile power packs.

WATERTOWN DIVISION
THE NEW YORK AIR BRAKE COMPANY
STARBUCK AVENUE • WATERTOWN - N.Y.



NEW JOB for a
SATISFIED CUSTOMER

The aft-mounted retractable stairway pictured above, installed by PAC in an executive Convair 240 for long-time customer Murray Corporation of America, is a concrete example of Pacific Airmotive's expert performance in all phases of aircraft modification and maintenance.

First assembly of its kind ever built for a Convair 240, the stairway was designed, fabricated and installed by PAC in only nine weeks. Major engineering problems were successfully solved under under deadline conditions.

Corporate or airline operators with difficult or unusual problems demanding superior engineering and production skills look first to Pacific Airmotive. From Bonanzas to DC-7s, PAC's "one-stop" service means one stop at one location for any type of work on airframe, engines, propellers, accessories, radio, instruments or cabin interior, with all items coordinated to get the job out on schedule.

PAC

PACIFIC AIRMOTIVE CORPORATION

2940 N. HOLLYWOOD WAY, BURBANK, CALIF.

Circle No. 104 on Reader Service Card.

1958 Editorial THEMES

Themes are NOT special issues. They are an editorial bonus for advertisers and readers alike . . . supplements to be added every second issue to all the regular editorial features of AMERICAN AVIATION.

Jan. 27—Aeronautical Purchasing
Feb. 24—Metals, Materials and Hardware
March 10—Army Aviation (Special)
March 24—Aircraft Systems and Accessories
April 21—Annual Air Transport Progress Issue
May 19—Aircraft Furnishings & Interior Equipment
June 30—Annual Directory of Transport & Business Aircraft

AMERICAN AVIATION PUBLICATIONS
World's Largest Aviation Publishers
1001 Vermont Avenue, N. W.
Washington 5, D. C.

SIDELIGHTS

Seal the cockpit!

The county pathologist in Kern County, Calif., Dr. Robert Huntington, Jr., has been conducting studies into the possible link between sprayplane crashes and inhalation of insecticide fumes by pilots.

"There is reason to believe that pilots' reactions are dulled by inhaling phosphoric fumes from the plane spray tanks," said County Coroner Stan Newman. "There are numerous cases on record which show that these pilots crash into power lines or irrigation standpipes even after they are aware of such obstacles and have avoided them on prior passes over the field."

A loud celebration

Sonic booms are quite unpopular in most communities, but in Palmdale, Calif., the Chamber of Commerce arranged for a sonic boom from a jet plane overhead to signal the groundbreaking of a new 16,000-acre airport industrial center. Jets are the lifeblood of Palmdale.

Mayor—pubrel man

There's at least one mayor in the aviation fraternity. He's F. Clark Smith, who handles advertising and public relations for Eclipse-Pioneer Division of Bendix at Teterboro, N. J. His Honor is mayor of Old Tappan, a community of 3,200 along the New Jersey-New York state border. He gets no pay but has many other rewards including the privilege of performing marriage ceremonies. Lots of night and weekend work but he's enjoying the job.

Patient man is Quarles

Wings Club may have set a record of some sort at its annual dinner in New York Nov. 18. The program dragged so much that the main speaker, no less a person than Deputy Secretary of Defense Donald Quarles, wasn't introduced until after 10:45 p. m. He was seen penciling portions out of his speech as the evening wore on.

New missile program launched

G. Harry Stine, former Martin Co. engineer who was fired after he charged that the U.S. had dragged its heels and was five years behind Russia in missile development, is back in the missile business—building workable models.

Stine's missiles weigh 1½ ounces, are powered by solid-propellant rocket engines that produce 18 ounces thrust and will take the vehicle up to 1,000 ft. at 150 mph. At altitude, the nose cone is blown off and it and the missile are parachuted safely to earth.

Cost of missile and launching rig: $8. Cost of rocket engines will be about 35-40¢ each. Technique for models was developed by Orville H. Carlisle, Norfolk, Neb., who is president of Stine's company.

Nebraska leads the way

The State of Nebraska is out promoting air travel in a way that could boom the industry if the other 47 states would take the cue.

Under direction of Rolland A. Harr, director of Nebraska's Dept. of Aeronautics, a year-round dynamic campaign is on to stimulate local airline service. Philip Geary, former assistant director of world education for TWA, is heading up the traffic stimulation program. He and others are speaking at every opportunity on benefits of air travel, and, it might be added, Geary has covered a lot of ground since he went to work for the department last May.

A resume of what's going on in Nebraska was included in the department's recent petition to CAB for a Nebraska Northern Route. A nod to Harr, Geary et al.

More on computers . . .

Lockheed estimates that for $201,000 of digital computer cost it obtained $27,960,000 worth of mathematical solutions in an 18-month period of performance analysis on the F-104 Starfighter.

Frank P. Cozzone, manager of engineering mathematical analysis, says 1,300 mathematicians, using desk calculators, would have required 5,030,000 manhours—or approximately two years—to accomplish the job done during the 18-month period by the IBM 704 computers in 386 hours—or 48 days.

Manhours spent in programming and operating the computers amounted only to 20,800.

New pilot for the X-15?

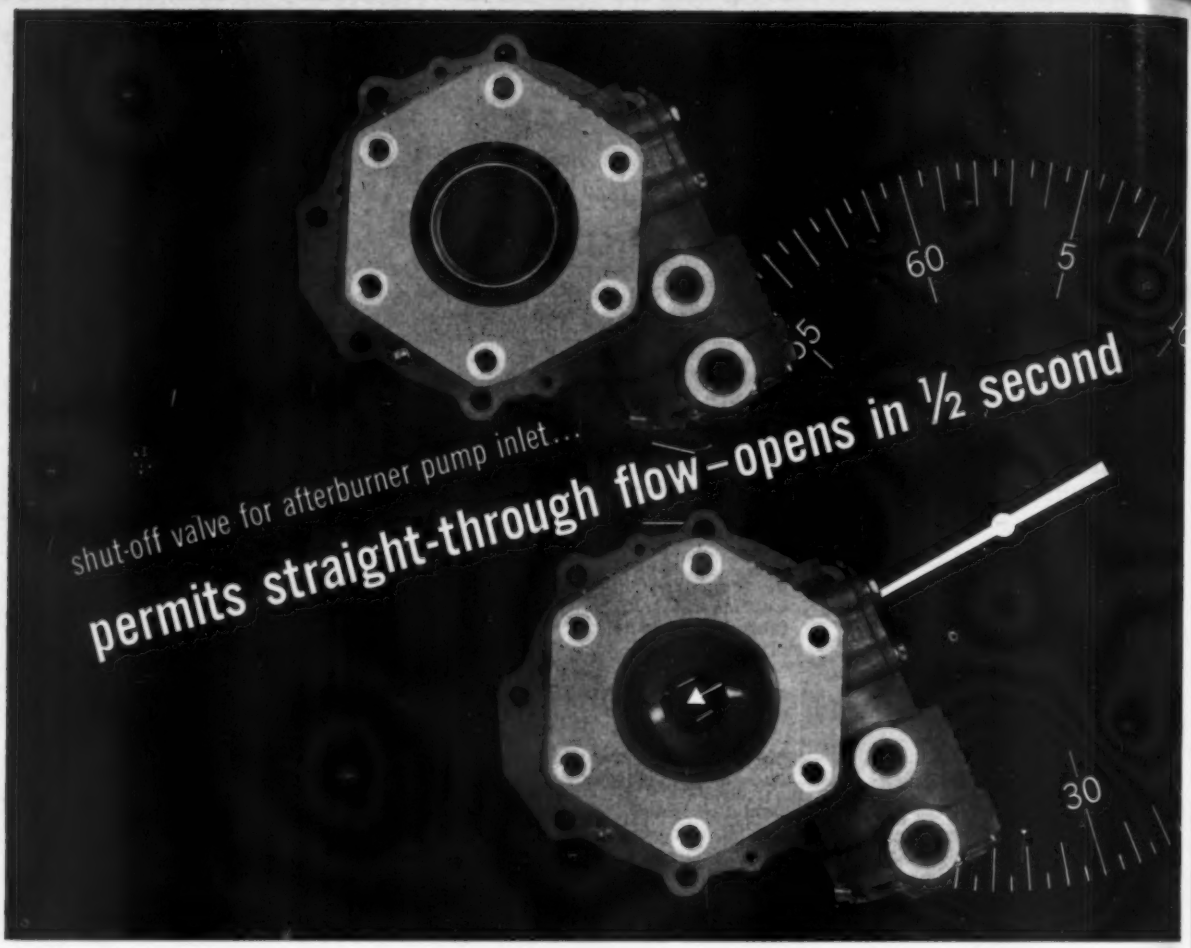
North American Aviation received the following letter from a 15-year-old German aviation enthusiast:

"I am sorry that I am not can good speak english. I have hear, that the X-15 with no man flys into the air. I will go with this rocket into the air. I am only fifteen years old, but I have the pilot examination. In springtime I will been sixteen years, I am 160 cm. big. When I am grown up, I will be a pilot by the U.S. Air Force. PLEASE, built a cockpit into the rocket.

"Successfully your of good answer hoping

"Walter Fleischer"

Walter apparently had some other aircraft in mind. NAA assured him there is a cockpit and that Scott Crossfield will fly the X-15 research aircraft when it is ready.



Here is an example of how Whittaker can tailor a *valve* to a unique requirement so that it becomes an integral part of the customer's package—a pump package!

The purpose of the pump-valve assembly is to provide thrust augmentation where instant response is required. The valve is designed to open in ½ second to permit unimpeded flow to the afterburner pump, thus contributing to the high effciency of the system.

The valve was designed in cooperation with a leading pump manufacturer for the afterburner pump used on one of the latest high thrust–light weight jet engines.

It incorporates the pump inlet seal as part of the valve unit to form an optimum, minimum size and weight pump-valve assembly. The straight-through passage is obtained by use of a spherical plug which offers as an additional advantage the ability to operate over a wide range of flow and pressure with little effect on actuation time and power.

Such fuel problems are solved regularly by Whittaker Controls' engineers. Their experience is available to *you*.

PERFORMANCE:

Service fluid: Aircraft fuels, Mil-F-5624, Mil-F-5572

Temperature: Ambient, –65°F to plus 325°F Fluid, –65°F to plus 250°F

Pressure: Fuel–100 PSI. Actuation Fluid Pressure–20 to 1000 PSI

Actuation: Piston Powered. Actuation fluid can be controlled by mechanical or electrical pilot valve.

Life: 10,000 cycles.

Whittaker

CONTROL SYSTEMS

Fuel • Hydraulic • Pneumatic

Los Angeles • Seattle • Wichita
Indianapolis • Washington, D.C.
Hempstead, Long Island

A Division of Telecomputing Corp.

SEND THIS COUPON FOR COMPLETE INFORMATION

Whittaker Controls
915 N. Citrus Ave., Los Angeles 38, Calif.

Gentlemen:
Please send me further information on the Whittaker Shut-Off Valve for Afterburner Pump Inlet, P/N132615.

Check one: ☐ Reference Information ☐ Project Information

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

ENGELBERGER

KRETSCH

MUNDORFF

HENRIKSEN

DE LUCA

HAVERLY

Manufacturing

Name	New Position	Former Position
Joseph F. Engelberger	Pres., Consolidated Controls Corp.	Gen. mgr., Aircraft Products Div.
H. W. Kretsch	VP and chief engr., Consolidated Controls Corp.	Chief engr., Aircraft Products Div.
George T. Mundorff (RAdm USN, ret.)	Exec. asst. to vp and asst. gen. mgr., Link Aviation, Inc.	Detroit Controls Div., American Radiator Standard Sanitary Corp.
Gerald M. Henriksen	Dir. engrg., Acoustica Associates, Inc.	Dir. R.&D. Turbo Div., American Machine & Foundry Co.
Frank P. DeLuca, Jr.	Dir. military contracts, Acoustica Associates, Inc.	Contract admin., Turbo Div., American Machine & Foundry Co.
Robert S. Kinsey	Dir. engrg., Utica div., Bendix Aviation Corp.	VP-operations, Reaction Motors
C. Joseph Zohn	Mgr., admin. services dept., Lockheed Missile Systems' R&D branch	In chg. admin. services, electronic and radar labs.
Dr. Donald M. Allison, Jr.	Mgr., Bendix Radio Div., govt. products group	Chief engr., radar engrg. dept.
Edward F. Sherrod	Chief account admin., Customer Relations Div., Ryan Aeronautical Co.	With Convair
R. M. Wilson	Mktg. dir., defense divisions, Westinghouse Electric Corp.	Sales mgr., defense divisions
George E. Carlson	Chm. bd., Minnesota Rubber and Gasket Co.	President
Robert W. Carlson	President, Minnesota Rubber and Gasket Co.	VP and gen. mgr.
R. F. Walker	Asst. to gen. mgr. in chg. A3J program, Columbus Div., North American Aviation	Asst. to gen. mgr., Columbus Div.
G. P. McCormick	Asst. to gen. mgr. in chg. T2-J and other military programs, Columbus Div., NAA	Gen. supt., detail mfg. and development
M. A. Haymore	Asst. to gen. mgr. in chg. commercial programs, Columbus Div., NAA	Dir., material
Roger Tate	Dir. research, Delavan Mfg. Co.	Chem. engr., Kearney & Trecker Co.
Donald B. Schneider	Sales mgr., Neff Instrument Corp.	Consolidated Electrodynamics Corp.
Sterling B. Jones	Chief engr., Monogram Mfg. div., Monogram Precision Industries, Inc.	Product design engr., Wedgelock, Inc.
Phillip G. Stratton	Dist. sales engr., The Kaynar Mfg. Co.	Sales engr., Driv-Lok Pin Co.
Ronald J. Banks	Product engr., Dayton Field Office, Reaction Motors, Inc.	Test and product engr., Denville, N. J., office
Hunter C. Harrison	Washington, D.C., rep., Reaction Motors, Inc.	Asst. Washington rep.
Emil L. deGraeve	Corporate staff-development and planning, Litton Industries	With Stanford Research Institute
Jerry Church	Southern Div. mgr., Airwork Corp.	Mgr. Florida Branch
John E. Faloon	Supv. Mycalex operations, General Electric	In plastics dept.
Robert M. Rowe	Dir. engrg., Pulse Engrg., Inc.	With Stanford Research Institute
Albert W. Brandmaier	Mgr. European sales office, Consolidated Electrodynamics Corp.	Mgr., dist. sales office, Washington, D.C.
Norman Malkin	Design engr., Instruments Div., Philips Electronics, Inc.	Asst. project engr., Bulova Watch Co.
Richard L. Bracken	Adv. mgr., Federal-Mogul Service	Industrial sales engr., Pittsburgh dist.
Glenn G. Whitaker	VP, Sierra Tool & Mfg. Co., Inc.	VP-field engrg., Wm. R. Whittaker Co., Ltd.
Douglas A. Morrison	Western regional mgr., Electronic Communications, Inc.	Sales mgr., Aircraft Products Div., Air Associates
Dr. William R. Millard	Mgr. engrg. dept., Callery Chemical Co.'s Research and Development Div.	Asst. supv.
Boone Guyton	Sales mgr., Hamilton Standard Electronics Dept.	Mgr., sales and service, Norden-Ketay Corp., Instruments and Systems Div.
Jack Winslow	Mgr., mfg. services dept., Waste King Corp.'s Technical Products Div.	Production control supv.
Lloyd E. Thompson	Supv. engrg. analysis group, Weber Aircraft Corp.	Project engr., ejection seat group
Walter T. Camp	Gen. mgr., Arrowhead Products Div., Federal-Mogul-Bower	Bearings Co. of America
Dr. Leland L. Antes	Sr. scientist, Hamilton Standard Electronics Dept.	Wright-Patterson AFB, Dayton
Ralph L. Bell	Military transport systems mgr., Boeing Transport Div.	Transport Div. dir. of sales
George R. Sanborn	Dir. sales and contracts, Boeing Transport Div.	Contracts administrator
Dr. Martin L. Klein	Dir., Research Div., Cohu Electronics, Inc.	North American's Rocketdyne Div.
Ralph W. Kummer	Gen. mgr., Bay Aviation Services Co.	Pub. rel. and adv. mgr., Hiller Helicopters
R. L. Eveleth	VP and gen. mgr., Southeast Machinery Co.	Sales and mfg. exec., United Aircraft Corp.
George H. Stoner	Weapons system mgr. for Boeing IM-99 Bomarc	Planning staff head, pilotless-aircraft div.
Lon Storey, Jr.	Electra engrg. mgr., Lockheed	Electra project engr.
Walter R. McLachlan	Exec. vp, admin. and coordination, A. V. Roe Canada Ltd.	Pres., Orenda Engines Ltd.
Fred T. Smye	Exec. vp, aeronautical, A. V. Roe Canada Ltd.	Pres., Avro Aircraft Ltd.
A. C. MacDonald	Exec. vp, industrial, A. V. Roe Canada Ltd.	Pres., Canadian Car Co.

Airline

Frederick R. Haverly	Dir., food catering service for American Airlines	Mgr., food service
Robert H. Herrnstein	Treas., Alaska Airlines, Inc.	Treas. and vp-finance, Bonanza Airlines
Chester L. Miller	Asst. vp-operations, Alaska Airlines, Inc.	Asst. cargo mgr., Eastern Airlines
Gail M. Oxley	Secy., Panagra (Pan American-Grace Airways)	Asst. vp and South American ind. rel. dir.
Fred M. Knight	Dir. pub. rel., Northeast Airlines	VP and dir., Chambers & Wiswell, Inc.
Manuel Ferreira Guimaraes	Pres., Panair do Brasil	Director
Robert W. Tuttle	Pres., each operating company of Airlines Terminal Corporations of Manhattan	Gen. mgr.

Government

David Bluestone	Asst. to L. W. Burton, Jr., spec. asst. to Civil Aeronautics Administrator	Dir., Air Transport Div., Defense Air Transport Adm.
John Rodgers	Dir., Air Transport Div., Defense Air Transport Adm.	With CAA Rio de Janeiro office

Design leadership in oil control for

THE BULLETIN BOARD

Undisplayed Advertising: $2.00 per line, minimum charge $6.00. Cash with order. Estimate 30 capital letters and spaces per line: 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address. **Displayed Advertising:** $20.00 per column inch. Space units up to full page accepted in this section for classified-type advertising. Forms close three weeks preceding date of issue. Address all correspondence to Classified Advertising Department American Aviation Publications, 1001 Vermont Ave., N. W., Washington 5, D. C.

SERVING THE INDUSTRY AS SUPPLIERS OF DOUGLAS PARTS AND COMPONENTS

FARRAR AVIATION

WE SOLICIT OPEN ACCOUNTS FROM WELL RATED FIRMS

One of the world's largest inventories of DOUGLAS DC-3 & DC-4 PARTS

FARRAR AVIATION-WUX State Dept. Export Reg. No. 4153

325 WEST MAIN STREET P. O. BOX 113 ONTARIO, CALIF. YUkon 6-6746 CABLE ADDRESS "FARRAIR"

Help Wanted

HELP WANTED

ASS'T TREASURER AND CHIEF ACCOUNTANT—Desire man 30-40 with broad knowledge and experience in all phases airline accounting. Apply, furnishing resume and stating expected salary. All replies confidential. BONANZA AIR LINES, P. O. Box 391, Las Vegas, Nevada.

AVIATION JOBS AVAILABLE—Write to: Fitzgerald, (Chicago Division), Dept. A-12, 815 Countryside Drive, Wheaton, Illinois.

POSITIONS OPEN in expanding domestic scheduled airline for Station Managers, Sales Representatives, Reservations and Ticket Office Agents, Maintenance and Overhaul Supervisors and Mechanics. Write to Box No. 134, AMERICAN AVIATION Magazine, 1001 Vermont Ave., N.W., Washington 5, D.C.

THE SKYMOTIVE STORY

Complete ENGINEERING CONSULTATION and LAYOUT

skymotive

O'HARE FIELD CHICAGO

HANGARS

100% Financing

We offer hangars to fill any requirement with financing up to 100%. Get full details before contracting!

ANDERSON STRUCTURAL STEEL CO.

1700 Sawtelle Blvd., Los Angeles 25, Calif.

FOR SALE

C-46F AIRCRAFT

Passenger and Cargo

With or Without T-Category Kit Installed

DC-6C AIRCRAFT

Passenger/Cargo

Immediate Delivery

•

The Flying Tiger Line Inc.

Burbank, Calif.

Call or Cable, Fred Benninger

Executive Vice President

Tel: Stanley 7-3411, Cable: Flytiger

FOR SALE

SCHEDULED AIRLINE INVENTORY

OF

DC-4 AND C-46F MATERIAL

Consisting of

Airframe, Engine, Radio and Instrument Parts

Ground Handling Equipment

ZERO TIME ON FOLLOWING ENGINE MODELS

R-2000-7M2 R-2800-75

R-2800-51 R-2800-75M2

also

R-2800-CB-16-17

THE FLYING TIGER LINE INC.

Lockheed Air Terminal, Burbank, Calif.

ATT: DOUGLAS S. DULY *Mgr. Aircraft Material Sales*

Tel: Stanley 7-3411 Cable: Flytiger

BOOKS

Aircraft Annual. *Edited by John W. R. Taylor. Philosophical Library, New York. 96 pages. $6.*

Latest information on the advance of the air age is presented in a series of articles written by leading aviation writers. The book is illustrated by many photographs. One of the contributors is James Hay Stevens, London editor for AMERICAN AVIATION.

A History of the United States Air Force 1907-1957. *Edited by Alfred Goldberg. D. Van Nostrand Co., Inc., Princeton, N. J. 288 pages. $6.75.*

This is an official general history of the United States Air Force and its predecessors prepared by the Air Force Historical Division in cooperation with the editors of *Air Force* magazine. The volume covers just about every facet of the nation's air arm and presents a dramatic account of the strategic role Air Force now plays in defense of the free world.

Whites Air Directory and Who's Who in New Zealand Aviation *(including the South Pacific) Vol. No. 8, 1956-57. Published by Whites Aviation Ltd., 603 Dilworth Bldg., Queen St., Auckland, New Zealand. 152 pp. Price, 10 shillings and 6 d. ($1.50).*

Full information on all phases of aviation in New Zealand is given in this directory. In addition to comprehensive data on all companies associated with aviation, the directory gives a list of all aircraft registered in New Zealand, data on all airports and a list of licensed pilots and aircraft maintenance engineers. The who's who section contains biographical data on all the leading personalities in New Zealand aviation. A particularly useful feature is a historical summary of New Zealand aviation.

ADVERTISERS INDEX

AC Spark Plug Div.,-General Motors Corp.	69
Adams-Rite Manufacturing Co.	73
Aero Corporation	73
Air France	42
Airaterra	64
Aircraft Radio Corporation	6
American Airlines, Inc.	47
Avco Manufacturing Corp.	34
B&H Instrument Co., Inc.	17
Bendix Aviation Corp.,	
Bendix Products Div.	65
Scintilla Div.	9
Bristol Aeroplane Co., Ltd.	40, 41
Bulletin Board (Classified)	76
Continental Motors Corp.	4
CONVAIR—A Div. of General Dynamics Corp.	20
Curtiss-Wright Corp.	33
Ethiopian Airlines, Inc.	36
B. F. Goodrich Aviation Products, a Div.-The B. F. Goodrich Co.	26
Goodyear Tire & Rubber Co., Inc., The	3
Grumman Aircraft Engineering Corp.	14, 15
Hi-Shear Rivet Tool Co.	18
Janitrol Aircraft-Automotive Div., Surface Combustion Corp.	8
Joy Manufacturing Co.	25
Kelsey-Hayes Co.	61
Lockheed Aircraft Corp.	66, 67
Martin Co., The	38, 39
Monsanto Chemical Co.	10, 11
National Aeronautical Corp. (NARCO)	68
New York Air Brake Co., The Watertown Div.	72
Orenda Engines Limited	1
Pacific Airmotive Corp.	12
Pratt & Whitney Aircraft Div., United Aircraft Corp.	70, 71
Resistoflex Corp.	19
Rolls-Royce, Ltd.	56
Simplex Piston Ring Manufacturing Co.	77
Southwest Airmotive Co.	16
Swedlow Plastics Co.	79
Texas Co., The	80
Thompson Aircraft Tire Corp.	13
Trans World Airlines, Inc.	55
United Air Lines, Inc.	48
Voi-Shan Mfg. Co.	62
Watertown Div., The New York Air Brake Co.	72
Wilcox Electric Co.	2
Whittaker Control Systems, a Div. of Telecomputing Corp.	74

AMERICAN AVIATION

PUBLISHING CORPORATION . . . American Aviation Publications Inc.: Principal offices at 1001 Vermont Ave., N.W., Washington 5, D. C. Wayne W. Parrish, president; Leonard A. Eiserer, executive vice president and secretary-treasurer; Albert H. Stackpole, Eric Bramley, Robert H. Wood, Fred S. Hunter and Robert R. Parrish, vice presidents; Louis C. James, ass't secretary-treasurer.

OTHER PUBLICATIONS AND SERVICES . . .

AVIATION DAILY: Overnight service for the entire industry. $200 per year.

WORLD AVIATION DIRECTORY: Twice-yearly listing of products, people and organizations. $9, U.S.A., Canada. $10, Overseas.

OFFICIAL AIRLINE GUIDE: Monthly publication of airline schedules, fares. World-Wide Edition: $19.50 per year everywhere. North American Edition: $13.50 per year, U.S.A.; $14, Canada; $15, elsewhere. Published from 130 N. Clark St., Chicago 2.

MISSILES AND ROCKETS, MAGAZINE OF WORLD ASTRONAUTICS: For those in missiles and rockets industry and satellite science. $8, one year; $12, two years—U.S.A., Canada. $9, one year, $14, two years—Overseas.

AIR TRAFFIC NEWS (INCORPORATING AIR TRAFFIC DIGEST): Daily rates and tariff news. $200 per year.

AIRPORTS: Weekly newsletter for airport officials, suppliers and services. Air-mailed Fridays, $25 per year.

AIR INFORMATION DIVISION: Specialized service that digests, for the scheduled airlines, their timetables, fares and charges. 595 Broad Ave., Ridgefield, N. J.

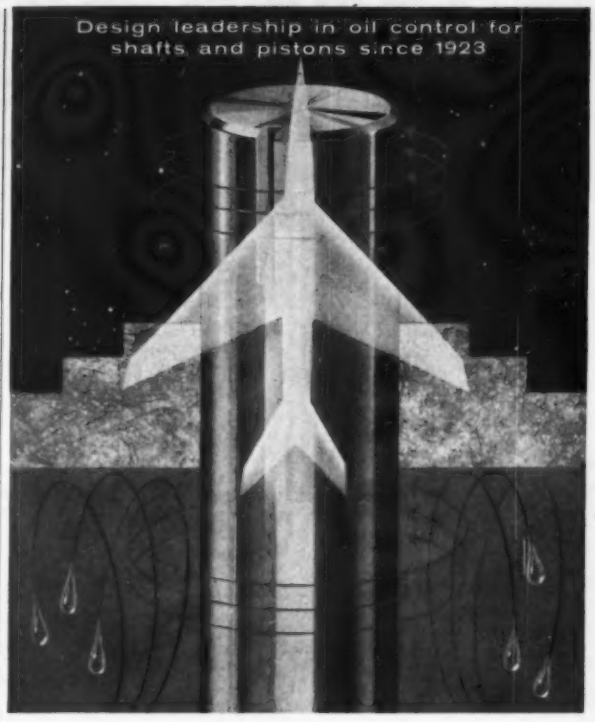
WHO'S WHO IN WORLD AVIATION: First reference work of its kind. Over 2,200 biographies of aviation's leaders. 345 pp. De luxe bound. $10 per copy, p.p.

AIRCRAFT YEAR BOOK: (Official Publication of Aircraft Industries Association.) Comprehensive reference of aviation industry products, sales, technical progress. $6 per copy p.p. anywhere.

AVIATION FACTS AND FIGURES: (Official Publication of Aircraft Industries Association.) Accurate handbook of authoritative statistics on all phases of aviation. $1 per copy, p.p. anywhere.

AIR CARGO MAGAZINE AND OFFICIAL GUIDE: First monthly publication of its kind serving all phases of cargo industry. $10 per year—U.S.A., Canada; $11.50 per year—Overseas. Published from 139 N. Clark St., Chicago 2.

ARMED FORCES MANAGEMENT: Monthly magazine. Provides interchange of information between industry and Armed Forces on latest techniques and developments in management field. $2, one year; $3, two years—U.S.A., Canada; $3, one year; $5, two years—Overseas.



HIGH SPEED shaft sealing problems?

...solve them with SIMPLEX

Shaft speeds to 20,000 rpm and higher present special problems in shaft seal design — especially when high temperatures or other special conditions may also be involved.

To designers and builders of jet or reciprocating engines and auxiliaries, SIMPLEX offers exclusive design principles and extended industry experience in solving similar problems. SIMPLEX products are original equipment in Allison, Pratt & Whitney, Wright and other leading aircraft engines.

Whether your oil control problems involve shaft seals or piston rings, SIMPLEX engineers will be glad to help you work them out. Call, wire or write.

Simplex Piston Ring Mfg. Co.

12301 BENNINGTON AVENUE • CLEVELAND 11, OHIO
75 N. E. 74th STREET • MIAMI 38, FLORIDA

SIMPLEX
HIGH SPEED SHAFT SEALS AND PISTON RINGS

Circle No. 108 on Reader Service Card.

EN ROUTE

by Wayne W. Parrish

Report on one of the world's most unusual airlines

IN THE VERY HEART of the great Australian continent, in the small, hot frontier town of Alice Springs, I found the headquarters of one of the most unusual airlines in the world.

Ever heard of Connellan Airways? Probably not, and for that lapse of knowledge you may be excused. But in the vast, sparsely-settled Northern Territory, Connellan Airways is a vital lifeline.

Just figure this out: It has 11,000 route miles to serve about 6,000 people. It serves 97 airfields and the usual frequency is a flight every week or two.

But I doubt that anywhere on the globe any other airline serves a more indispensable purpose.

As soon as I had had a big breakfast of ham and three eggs—I'll say this about Australia, they really go for three eggs at a time—I walked down the dusty street (waving away those pesky bush flies by the droves) to a new small building where Connellan Airways has a pleasant, neat ticket office. I said I wanted to pay a call on the company.

A friendly gal told me that all the offices were at Connellan's own airport a couple of miles southwest of town and that E. J. Connellan, the moving and driving spirit behind the airline (he has been decorated for his work), was out on the line somewhere. But she called Capt. Ian Leslie, the general manager, and he told the gal to bring me out.

Think back to the early days of the business and you have the picture. A few dusty hand-painted road signs directing you to the airport. A turf field and none too big. A couple of hangars with doors that never get closed. Equipment scattered about. Don't get me wrong, however. This was a real working base without frills; the kind of grass roots stuff from which air transport was born.

Nothing plush here

The offices consisted of a series of patchwork rooms, sort of lean-to's to the hangar. A couple of women were bookkeepers and secretaries. Family style. Nobody had time or means to have any plush quarters. But here was the working center of a real frontier network. Capt. Leslie, a tall Aussie in tropical shorts, took me on a meandering course back to his little hideaway office. As I recall, I sat on an old airplane seat.

I only wish I could have had the time to take a flight around some of Connellan's routes, but time is the thing that's needed because when you leave on a full circuit you're gone a long time.

Connellan's network covers an area of great size. I don't know how many square miles, but let's say that it extends over a batch of our western states. It extends north about a thousand miles and it must be a thousand miles wide. Outside of a few small towns, its stops are stations, big ranches, and each station is the local airline representative.

No navaids at all

There are no air navigation aids of any kind. It takes 18 months to two years to train a pilot before he can go out on his own—and he's really on his own. He has to know every dry stream and every bluff. Of course he has a radio but all flying is VFR and, over the vast distances, the radio is only of talking help anyway.

In a recent 12-month period, Connellan flew 1,166 passengers. Not so much, you say, but it's the only means of transport in a vast area that is gradually being opened up to civilization. More important, it flew 61.7 tons of cargo and 38.5 tons of mail. It operates under a ten-year government contract, with six years to go, and of course is subsidized because a purely commercial venture would be impossible.

The line runs on a very strict schedule, the biggest reason of all being safety. If a pilot is late at any stop, the station agent gets on the radio at once. The company is ready for a search at all times in case a pilot gets lost or goes down, but to date the record is excellent and not a passenger has been hurt. You have to like the wide open spaces and flying in all sorts of weather to fly for Connellan. But there are plenty of pilots who like it, including one American, Harold J. Manley.

Flight equipment is gradually becoming U.S.-built. Originally Connellan began with small British types but now it has two Cessna 180s, one Beech 17, two Beech 18s and still operates two old deHavilland Rapides and some Tiger Moths and Austers for ambulance work.

Connellan is tied in directly with the famed Australian Flying Doctors' Service which reaches far into the outback in one of the best demonstrations of the valuable use of the airplane in today's world. The airline does about 14 flights a month for the doctors' service under contract with the government. It had performed about 1,300 flights up to last March when I was in Alice Springs.

There are 28 employes on the airline and all maintenance and overhaul work is done on this little base far in the country's interior. Thirty gas dumps are maintained in the big territory for emergency use, hauled during the dry season by trucks.

The network and its traffic demands are maintained by a big radio network. Each ranch station has a radio and at various times during the day everybody in that part of Australia can get on the open circuit and make requests for seats or cargo or medical or other supplies and that's the way Connellan knows what its load is going to be like.

I listened on the radio for awhile and it's quite a fascinating experience. There are no telephones, of course, through that vast area. If a rancher 750 miles out wants to be picked up on next Thursday's schedule and taken somewhere, he gets on the radio and the space is blocked off.

As a matter of fact there are not one but several radio centers and radio telegraph is used from some of the outlying centers to the Connellan offices in Alice Springs. Sometimes there are backlog problems, especially in the rainy season when surface transport is impossible and the stations are relying on the air service for food or emergency supplies. The northern part of the Territory is quite rainy and tropical, but the southern half is normally arid desert.

Pilots are versatile

The pilots do a lot besides fly. They collect money, arrange fares for passengers and freight, and are in complete charge of the trip from making change to keeping schedule.

Capt. Leslie took me through the shops. Nothing fancy, but very adequate. Later he took me on a tour of the town and up to a bluff overlooking the valley, made green by springs. And at the end he presented me with an overnight bag of Connellan Airways, Alice Springs. It's the best overnight bag I've got. I've had a lot of pleasure taking it with me on trips, even to Europe.

When somebody looks at it and says, "Alice Springs, where in the world is that?", I look at them with intolerant disgust and say, "You mean you don't know where Alice Springs is? Where you all been, you lowlife peasant? Everybody knows where Alice Springs is." Well if they don't know, they should. Except for those dreadful flies, it's an interesting frontier town and Connellan Airways is one of the best examples of useful air transport I've ever seen. That's real open-space living out there, friends.

NOW! STAINLESS STEEL

HONEYCOMB AVAILABLE FROM SWEDLOW

Exclusive Licensee! Swedlow has been licensed by Solar Aircraft Company to manufacture and sell resistance-welded stainless steel honeycomb core in the United States and Canada.

Under the agreement, Swedlow has exclusive rights to Solar's unique honeycomb core processes and machinery... and will continue to provide the same high quality enjoyed in the past.

Your inquiries are invited!

High Strength-Weight Ratio
High Rigidity-Weight Ratio
High Vibration Damping
High Fatigue Resistance

The use of stainless steel honeycomb core is expanding rapidly in a wide variety of aircraft and missile assemblies and parts, particularly where such parts experience high engine temperatures, aerodynamic heating, and corrosive environments. On your production line, use of honeycomb core assemblies reduces the number of parts, simplifies fabrication and assembly, reduces tooling, floor space and over-all costs per pound, and cuts repair and rework.

Basic data required in adapting this material to your needs include foil thickness, ribbon direction, cell size, type of material, and height, width and length of the sections you desire. Our engineering staff is available to assist you in establishing these design criteria. Write today to Swedlow... with this acquisition we now offer you a single source of both stainless steel and aluminum honeycomb core.

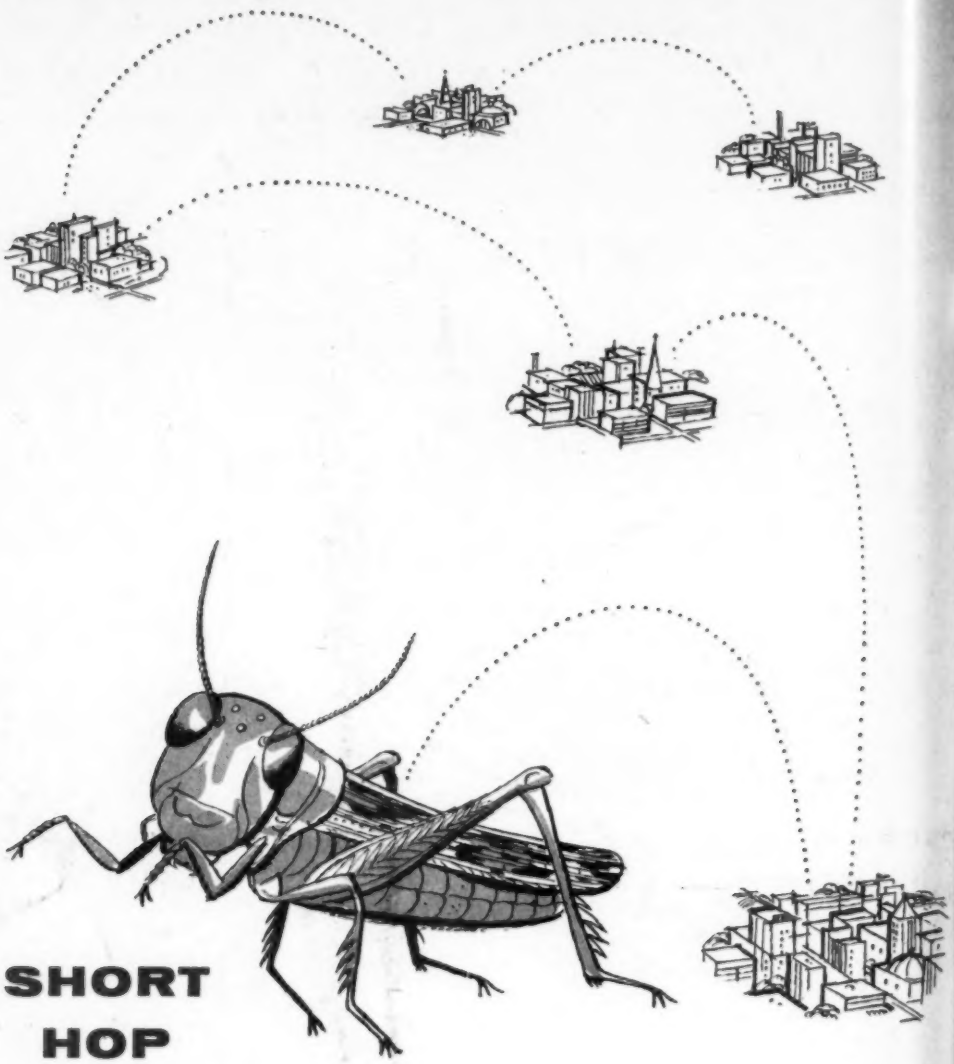
Swedlow
PLASTICS COMPANY

Los Angeles, California · Youngstown, Ohio

Please refer to Dept. 11

Swedlow Products: In addition to stainless steel honeycomb core... aluminum honeycomb core, fabricated honeycomb parts... low and intermediate pressure reinforced laminates, press or continuously formed ... molded plastic parts by matched tooling and vacuum methods... transparent plastic glazing materials, including stretched acrylic sheets and fabricated parts.

Circle No. 125 on Reader Service Card.



SHORT HOP SERVICE

More local service airlines in the U.S. are lubricated with Texaco Aircraft Engine Oil than with all other brands combined.

Local service airlines are doing a great and growing job providing fast, dependable transportation between the air-conscious smaller cities of America . . . and in acting as feeders for the major airlines. Dependable Texaco quality and service work for most of these lines—improving performance and reducing costs.

This predominant preference for Texaco is easy to understand when you consider that during the last twenty-two years, more scheduled revenue airline miles in the U. S. have been flown with Texaco Aircraft Engine Oil than with all other brands combined.

A Texaco Aviation Representative can give you full information on this exceptional service. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, *Aviation Division,* 135 East 42nd Street, New York 17, N. Y.

TEXACO

LUBRICANTS AND FUELS FOR THE AVIATION INDUSTRY

Circle No. 126 on Reader Service Card.